Installation Restoration Program (IRP)
Final Phase I Remedial Investigation Report
Appendix J

143rd Combat Communications Squadron
Seattle Air National Guard Station
Washington Air National Guard
Seattle, Washington

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APPENDIX J

ANALYTICAL DATA REVIEW AND VALIDATION REPORTS

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ANALYTICAL DATA REVIEW AND VALIDATION

Analytical data are the basis for evaluating environmental conditions at a site. It is essential that the data be accurate and reflective of conditions at the investigation site. To ensure that the quality of the analytical data was acceptable for decision making purposes, data collected as part of the Seattle ANGS RI were reviewed and/or validated. The data review and validation was performed to identify any limitations in the use of the data or any data that should not be used for decision making purposes. The quality of the data was assessed following the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review* (February 1993) and *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (February 1994).

Data were reviewed and/or validated for compliance with the following quality assurance/quality control (QA/QC) project and/or method-prescribed criteria:

- Holding Time: The period of time between the collection of the sample and the preparation/analysis of the sample. Analyses performed for this project have method-prescribed holding times.

- Calibration: The analysis of target analytes at a range of concentrations to develop a graphical plot of instrument response against the different analyte concentrations. An initial calibration curve establishes the graphical plot and the continuing calibration verification monitors daily instrument linearity against the initial calibration.

- Blank Samples: The preparation and analysis of reagent (contaminant-free) water or soil. Blank samples for this investigation included method, trip, rinsate, and field blanks. Detections in a blank sample are considered an indication of laboratory and/or transportation contamination.

- Spike Samples: The preparation and analysis of an environmental sample or a sample of reagent soil or water spiked with a subset of target compounds at known concentrations. The reagent sample spike

analysis measures laboratory accuracy and the environmental sample spike analysis measures potential interferences from the matrix.

- Internal Standards: Compounds similar to target compounds of interest that are added to sample aliquots for organic analysis. The internal standards are used to quantitatively and qualitatively evaluate retention time and response for each analytical run.

- Surrogate Spikes: Compounds similar to target compounds of interest that are added to sample aliquots for organic analysis. Surrogate spikes measure possible interferences from the sample matrix for the analysis of target compounds.

- Duplicate Samples: The preparation and analysis of an additional aliquot of the sample. The duplicate analysis measures potential heterogeneity of contaminants in environmental samples. Duplicate samples for this investigation included both field and laboratory duplicate samples.

- Interference Check Sample: The interference check sample (ICS) consists of two solutions: solution A and solution AB. Solution A consists of the known elements that cause an interference, and solution AB consists of the analytes of interest mixed with the interferents. An ICS analysis consists of analyzing both solutions consecutively, starting with solution A, for all wavelengths used to quantify each analyte reported by Inductively Coupled Plasma (ICP). The ICS applies only to metals analyzed by ICP, and provides information concerning potential false negative and positive detections in project samples.

- TPH Evaluation: The chromatograms of samples with positive detections of total petroleum hydrocarbons (TPH) were compared to the chromatograms of standards for pattern agreement.

- Completeness Review: The amount of valid useable data was compared to the amount of data expected to be obtained under optimum conditions.

The discussion that follows addresses each of the QA/QC components listed above and the results for each of the components. Data from the majority of the RI sample collection events at the Seattle ANGS were reported USEPA Level II. The USEPA Level II data were reviewed for exceedence of prescribed holding times, blank detections, matrix spike recoveries, surrogate recoveries, and laboratory duplicate relative percent

differences (RPDs). The data for selected soil samples collected in October 1996 and groundwater samples collected in April 1997 were reported USEPA Level IV. The validation of the USEPA Level IV data included a review of the components included in the USEPA Level II data review, as well as a review of the calibration results, internal standard response, ICS results, and a re-calculation of a portion of the raw data for verification of compound quantitation and instrument calibration calculations.

Holding Times

The sample analyses were reviewed for compliance with the method-prescribed preparation and analysis holding times. All of the samples were prepared and analyzed within the method-prescribed holding times. Accordingly, no sample results were compromised by an excessive period between sample collection and analysis.

Calibration Results

The laboratory performed initial and continuing calibration verifications (ICV and CCV). The ICV consisted of standards that were analyzed at either three or five concentrations that ranged from the method reporting limit to the upper linear range of the instrument. The laboratory calculated the percent relative standard deviation (%RSD) for each of the target analytes included in the organic ICVs. The laboratory evaluated the inorganic ICV using correlation coefficients. Data associated with an ICV that had target compounds with a %RSD or correlation coefficient above the method-prescribed acceptable criteria were qualified as either estimated, "J," for detected compounds, or estimated detection limit, "UJ," for non-detect compounds. Sample results that were qualified based on the ICV are listed in the individual data validation reports.

The CCV consisted of analyzing a standard at one concentration that was generally in the mid-range of the ICV standard concentrations. The laboratory calculated the percent difference (%D) between the CCV and the ICV for organic parameters, and the percent recovery (%R) in the CCV standard for inorganic parameters. Samples associated with a CCV that had target compounds with either a %D or %R above the method-prescribed criteria were generally qualified as either estimated, "J," for detected compounds, or estimated detection limit, "UJ," for non-detects. The %D for one volatile target compound was considered unacceptable and the associated non-detect data were rejected, "R." Sample results that

were qualified based on the CCV are listed in the individual data validation reports.

The majority of compounds that were qualified based on ICV or CCV results were not compounds of interest for this investigation. The qualified compounds include but are not limited to: isobutyl alcohol, 1, 4-dioxane, hexachlorocyclopentadiene, acetonitrile, 2-chloroethylvinyl ether, dibenzo(a,h)anthracene, benzo(g,h,i)anthracene, and benzidine. Therefore, the majority of ICV and CCV results for target compounds of interest were within method-prescribed criteria. The acceptable ICV and CCV criteria indicate that project sample quantitations were also within method-prescribed criteria.

Blank Samples

The four types of blank samples analyzed with the soil and groundwater samples were method, trip, rinsate, and field blank samples. Method blank samples are an aliquot of reagent soil or water that is prepared in the laboratory and analyzed with each batch of environmental samples. Method blank samples monitor for potential contamination of samples from laboratory sources.

Trip blank samples were prepared by filling a Volatile Organic Analysis (VOA) vial with reagent water and sealing it with a Teflon-lined septum lid. The laboratory prepared the trip blank samples, and these samples were opened by laboratory personnel only. Trip blank samples monitor for potential contamination of samples during collection and transportation to the laboratory.

Rinsate blank samples were prepared by pumping or pouring ASTM Type II reagent water through or over the decontaminated sample collection equipment. Rinsate blank samples monitor for potential cross-contamination of project samples from inadequate decontamination of sampling equipment.

Field blank samples were prepared by slowly pouring ASTM Type II reagent water into clean sample containers at a designated sample collection location. Field blank samples monitor for potential contamination of project samples from ambient conditions at the sample collection site.

Blank samples may occasionally become contaminated during preparation and/or analysis in the laboratory, or as a result of impurities present in the source water used to prepare the blanks. Chemicals detected in the

field and rinsate blank samples submitted during the Seattle ANGS RI include trihalomethane compounds, chloroform, and bromodichloromethane. These compounds are typically found in drinking water as a result of chlorinating and brominating treatment to control bacteria, and may have been incompletely removed by the apparatus used to produce ASTM Type II reagent water.

The method blank sample results were non-detect (ND) with the exception of one positive detection of the common laboratory contaminant bis(2-ethylhexyl)phthalate. Each of the project samples associated with the contaminated method blank were ND for bis(2-ethylhexyl)phthalate. Therefore, none of the samples required qualification based on the method blank detection. A positive detection of bis(2-ethylhexyl)phthalate was reported in one project sample. Although the associated method blank result was ND, this sample detection is suspected to be the result of laboratory contamination. Method blank and suspected sample results are listed on Table 1.

Each of the target analytes reported for the trip blank samples were ND with the exception of isolated detections of chloroform, 1,2-dichloropropane, methylene chloride, naphthalene, and tetrachloroethene. Analyte detections in project samples associated with the contaminated trip blanks were qualified as not detected, "U." Each of the sample detections that were "U" qualified based on a trip blank detection were less than 10 times (for common laboratory contaminants) or 5 times (for non-common laboratory contaminants) the concentration reported in the associated trip blank. Trip blank and associated sample results with any applied qualifiers are listed on Table 1.

Each of the rinsate blank results were ND with of the exception of isolated detections of TPH as gasoline, TPH as diesel, bromodichloromethane, chloroform, 1,2-dichloropropane, phenol, para isopropyltoluene, mercury, and zinc. Detected analytes in samples associated with the contaminated rinsate blanks that had not previously been "U" qualified by ERM based on trip blank results were qualified as not detected, "U." Each of the sample detections that were "U" qualified based on a rinsate blank detection were less than 10 times (or 5 times, as appropriate) the concentration reported in the associated rinsate blank. The source of the TPH detected in rinsate blanks may be due to laboratory contamination such as impure laboratory solvents used for sample extraction, mis-identified as TPH. Rinsate blank and associated sample results with any applied qualifiers are listed on Table 1.

Table 1

Blank and Suspect Sample Detections
Seattle ANGS, Seattle, Washington

Data Package	Blank ID	Affected Sample ID	Analyte	Matrix/ Units	Reported Concentration	ERM Qualifier*
610602	MW-4-96-1* (FB)		TPH as gasoline	Aqueous/ mg/l	1.2	
		MW-1-96-1	TPH as gasoline	Aqueous/ mg/l	1.1	U
		MW-2-96-1	TPH as gasoline	Aqueous/ mg/l	1.1	U
		MW-4-96-1	TPH as gasoline	Aqueous/ mg/l	1.2	U
		MW-5-96-1	TPH as gasoline	Aqueous/ mg/l	1	U
			Chloroform		32	
	MW-4-96-1* (FB)		1,2-Dichloropropane	Aqueous/ µg/l	1.3	
			Naphthalene		5.9	
		MW-1-96-1	Naphthalene	Aqueous/ µg/l	3.3	U
	TB101896-1-1 (TB)		Methylene chloride	Aqueous/ µg/l	7.7	
610585	SB-11-9* (FB)		Chloroform	Aqueous/ µg/l	39	
			1,2-Dichloropropane		2.4	
	TB101696 (TB)		Naphthalene	Aqueous/ µg/l	2.2	
		SB-9-9	Bis(2-ethylhexyl)phthalate	Soil/ mg/kg	2.9	
96.03983	TB-121796-1-30 (TB)		Chloroform	Aqueous/ µg/l	27	
			1,2-Dichloropropane		6.3	
	MW-2-96-1-30* (RB)		Zinc	Aqueous/ µg/l	32	
			Chloroform		23	
			1,2-Dichloropropane		6.3	
			Phenol		21	
		MW-2-96-1-30	Zinc	Aqueous/ µg/l	60	U
		MW-3-96-1-30	Zinc	Aqueous/ µg/l	48	U
		MW-3-96-1-30dup	Zinc	Aqueous/ µg/l	16	U
		MW-4-96-1-30	Zinc	Aqueous/ µg/l	8	U
		MW-5-96-1-30	Zinc	Aqueous/ µg/l	94	U
	MW-5-96-1-30* (FB)		Lead	Aqueous/ µg/l	7	
			Zinc		6	
			Chloroform		30	
			1,2-Dichloropropane		4.6	
			Bromodichloromethane		1.2	
			Phenol		14	
97.00148	MB 1/17/97 (MB)		Bis-2-ethylhexyl phthalate	Aqueous/ µg/l	7.3	
97.00165	BS-005PZ-97-1* (FB)		Zinc	Aqueous/ µg/l	9	
			Phenol		3.1 J	
			TPH as gasoline		110	
			Diesel		1000	
	MW-3-97-1* (RB)		p-Isopropyltoluene	Aqueous/ µg/l	2.8	
			TPH as gasoline		120	
			TPH as diesel		880	
		BS-005PZ-97-1	Zinc	Aqueous/ µg/l	37	U
			p-Isopropyltoluene		4.4	U
			TPH as gasoline		480	U
		MW-3-97-1	Zinc	Aqueous/ µg/l	46	U
			TPH as gasoline		110	U
		MW-2-97-1	Zinc	Aqueous/ µg/l	7	U
		MW-2-97-1 dup	Zinc	Aqueous/ µg/l	50	U

Table 1

Blank and Suspect Sample Detections
Seattle ANGS, Seattle, Washington

Data Package	Blank ID	Affected Sample ID	Analyte	Matrix/ Units	Reported Concentration	ERM Qualifier*
			TPH as gasoline		120	U
97.01158	MW-1-97-2-2* (RB)		Zinc	Aqueous/ µg/l	51	
			Chloroform		61	
			Bromodichloromethane		57	
			Phenol		8.6	
		MW-1-97-2-2	Zinc	Aqueous/ µg/l	63	U
		MW-2-97-2-2	Zinc	Aqueous/ µg/l	120	U
			Chloroform		60	U
			Bromodichloromethane		57	U
		BS-005PZ-97-2	Zinc	Aqueous/ µg/l	120	U
97.01181	WMB 4/17/97 (MB)		Acetone	Aqueous/ µg/l	3.8 J	
			Methylene chloride		1.9 J	
			Naphthalene		0.54 J	
	WMB 4/21/97 (MB)		bis(2-Ethylhexyl)phthalate	Aqueous/ µg/l	1.7 j	
	BS-006PZ-97-2* (FB)		Zinc	Aqueous/ µg/l	42	
			Chloroform		76	
			Bromodichloromethane		70	
		BS-004PZ-97-2	Acetone	Aqueous/ µg/l	2.6 JB	U
			Bromodichloromethane		0.76 J	U
			Chloroform		0.81 J	U
			Methylene chloride		8.2 JB	U
			Naphthalene		1.6 JB	U
			Zinc		21	U
		BS-006PZ-97-2	Zinc	Aqueous/ µg/l	96	U
		MW-5-97-2	Acetone	Aqueous/ µg/l	2.8 JB	U
			Bromodichloromethane		1.2	U
			Chloroform		1.3	U
			Methylene chloride		5.9 JB	U
			Naphthalene		1.5 JB	U
			bis(2-Ethylhexyl)phthalate		1.6 JB	U
			Zinc		100	U
		MW-5-97-2 dup	Acetone	Aqueous/ µg/l	3.1 JB	U
			Bromodichloromethane		0.55 J	U
			Chloroform		0.59 J	U
			Methylene chloride		4.1 JB	U
			Naphthalene		0.89 JB	U
			bis(2-Ethylhexyl)phthalate		2.1 JB	U
			Zinc		30	U
		MW-3-97-2	Acetone	Aqueous/ µg/l	3.2 JB	U
			Bromodichloromethane		0.86 J	U
			Chloroform		0.91 J	U
			Methylene chloride		8.2 JB	U
			[illegible]		1.4 JB	U
			bis(2-Ethylhexyl)phthalate		3.9 JB	U
			Zinc		110	U
		MW-4-97-2	Acetone	Aqueous/ µg/l	2.4 JB	U
			Chloroform		1.4	U
			Bromodichloromethane		1.4	U

Table 1

Blank and Suspect Sample Detections
Seattle ANGS, Seattle, Washington

Data Package	Blank ID	Affected Sample ID	Analyte	Matrix/ Units	Reported Concentration	ERM Qualifier*
			Methylene chloride		4.6 JB	U
			Naphthalene		1.1 JB	U
			Zinc		130	U
97.02.014	TB-071097-1 (TB)		Tetrachloroethene	Aqueous/ µg/l	5.4	
		BS-004PZ-97-3	Tetrachloroethene	Aqueous/ µg/l	8.5	U
		MW-5-97-3	Tetrachloroethene	Aqueous/ µg/l	14	U
97.02029	MW-1-97-3* (RB)		Mercury	Aqueous/ µg/l	0.2	
			Zinc		40	
	BS-006PZ-97-3* (FB)		Zinc	Aqueous/ µg/l	9	
		MW-4-97-3	Zinc	Aqueous/ µg/l	42	U
		MW-3-97-3	Mercury	Aqueous/ µg/l	0.2	U
			Zinc		29	U
		MW-1-97-3	Zinc	Aqueous/ µg/l	44	U
		BS-006PZ-97-3	Mercury	Aqueous/ µg/l	0.2	U
			Zinc		38	U
		BS-005PZ-97-3	Mercury	Aqueous/ µg/l	7	
			Zinc		23	U
		MW-2-97-3	Mercury	Aqueous/ µg/l	0.2	U
			Zinc		25	U
		SW-1-97-3	Mercury	Aqueous/ µg/l	0.6	U

Key:
ERM - Environmental Resources Management
MB - Method Blank
RB - Rinsate Blank
FB - Field Blank
TB - Trip Blank
J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U - The analyte was analyzed for but not detected; the reported concentration should be considered the quantitation limit for the sample.
B - Laboratory data flag indicating compound was detected in the associated method blank.
* Data qualifiers applied to affected sample data points indicated.
mg/l - milligrams per liter
ug/l - micrograms per liter
mg/kg - milligrams per kilogram

Each of the field blank results were ND with the exception of isolated detections of TPH as gasoline, TPH as diesel, bromodichloromethane, chloroform, 1,2-dichloropropane, phenol, naphthalene, lead, and zinc. These isolated detections in the field blank samples may be the result of improper functioning of the equipment used to prepare the ASTM Type II reagent water. Analyte detections in samples associated with the contaminated field blanks that had not previously been "U" qualified by ERM were qualified as not detected, "U." Each of the sample detections that were "U" qualified based on a field blank detection were less than 10 times (or 5 times, as appropriate) the concentration reported in the associated field blank. As with the rinsate blanks, the source of the TPH detections in field blank samples may be the result of laboratory contamination mis-identified as TPH. Field blank and associated sample results with any applied qualifiers are listed on Table 1.

In summary, the trip blank and method blank data indicate that sample handling, sample transportation procedures, and laboratory conditions were acceptable with the above-noted limitations. The source of the multiple analyte detections in rinsate and field blanks may be related to faulty equipment used to prepare the ASTM Type II reagent water. There were few instances in which the target compounds detected in the rinsate and field blank samples were also detected in the associated project samples. Accordingly, the positive analyte detections in the rinsate and field blank samples did not impact the quality or usability of the associated data, except for the above-noted limitations.

Spike Samples

The two types of spike samples analyzed with the soil and groundwater samples were matrix and blank spike samples. Matrix spike (MS) samples consist of an aliquot of an environmental sample that is spiked with a subset of target compounds. MS samples monitor for potential interference of target compound responses from sample matrix effects. Blank spike samples, commonly referred to as laboratory control samples (LCS), are an aliquot of reagent soil or water that is spiked with a subset of target compounds. The LCS sample monitors laboratory accuracy without the potential bias of a sample matrix. The laboratory routinely performs spike samples in duplicate for organic analyses. These duplicate samples can be in the form of a matrix spike duplicate (MSD) and/or a laboratory control sample duplicate (LCSD).

Table 2 presents spike sample recoveries and relative percent differences (RPD) for spike sample duplicate pairs that were outside of acceptable limits. RPDs for MS/MSD and LCS/LCSD pairs are discussed below in the section "Duplicate Analyses." Each of the MS/MSD and LCS/LCSD recoveries was within the laboratory's upper control limits. Samples associated with an MS/MSD or LCS/LCSD recovery below the lower control limit, but above 10 percent were qualified "UJ," estimated detection limit, for ND spike compounds. Sample results associated with an MS/MSD or LCS/ LCSD recovery of 10 percent or less were qualified "R," rejected, for ND spike compounds. (A recovery of 10 percent or less is considered an indication of severe interference from the sample matrix and/or unacceptable laboratory accuracy.) Each of the samples associated with a low MS/MSD or LCS/LCSD recovery was ND for the target analyte with the low spike recovery.

The majority of the MS/MSD and LCS/LCSD recoveries were within the acceptable limits. The exceptions listed on Table 2 represent a small fraction of the data compared to the total amount of spike sample data reported. With the above-noted exceptions, the MS/MSD recoveries indicate minimal matrix interference and the LCS/LCSD recoveries indicate acceptable laboratory accuracy.

Internal Standard Responses

Internal standards were added to each of the samples analyzed for volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs). Internal standards were added to the volatile sample aliquots and to the semivolatile extracts. Internal standard response is used in the quantitation of detected compounds. By using the internal standards in the quantitation of detected compounds, changes in instrument and matrix responses can be accounted for in the reported concentrations.

Following USEPA Functional Guidelines, internal standard area counts and retention times from each of the sample analyses including QC sample analyses are compared to internal standard area count and retention time from the ICV. The sample internal standard area count must be within 1/2 to two times the ICV area count, and the retention time must be within ±30 seconds of the ICV retention time, in order for the sample results to be accepted without qualification.

Each of the sample internal standard responses and retention times was within the acceptable limits, with one exception. One of the six semivolatile internal standard area counts for sample MW-4-97-2 was

Table 2

Spike Recoveries and RPDs Outside of Laboratory Acceptable Limits
Seattle ANGS, Seattle, Washington

Data Package	QC Sample ID (a)	Analytical Method	Analyte	Matrix/Units	Reported Concentration in Unspiked Sample	% Recovery (MS/MSD or LCS/LCSD)	RPD	Control Limit (%) Spike	RPD	ERM Qualifier*
610574 & 610602 (b)	MW-2-96-1	6010/7000	Selenium	Aqueous/mg/l	ND	65		75 - 125		UJ
			Thallium		ND	65		75 - 125		UJ
610585	SB-8-9	8270	1,4-Dichlorobenzene	Soil/ mg/kg	ND	10/11 .		50 - 111		UJ
			1,2,4-Trichlorobenzene		ND	26/25		49 - 115		UJ
	LCS 10/30/96		1,4-Dichlorobenzene	Soil/ mg/kg	ND	41/15	94	50 - 111	25	(c)
			1,2,4-Trichlorobenzene		ND		46		24	(c)
			2-Chlorophenol		ND		41		32	UJ
	SB-8-9	6010/7000	Antimony	Soil/ mg/kg	ND	35		75 - 125		UJ
			Selenium		ND	143		75 - 125		(d)
			Thallium		ND	54		75 - 125		UJ
	SB-10-3	6010/7000	Antimony	Soil/ mg/kg	ND	33		75 - 125		UJ
			Thallium		ND	58		75 - 125		UJ
	LCS 10/25/96	6010/7000	Antimony	Soil/ mg/kg	ND	70		75 - 125		UJ
97.03983	MW-4-96-1-30	8270	4-Nitrophenol	Aqueous/µg/l	ND	11.8/11.8		1 - 132		UJ
97.00148	LCS 1/17/97	8270	4-Nitrophenol	Aqueous/µg/l	ND	5/6		1 - 132		R (e)
	BS-006PZ-97-1	8270	4-Nitrophenol	Aqueous/µg/l	ND	9/10		1 - 132		R (e)
97.00165	LCS 1/17/97	8270	4-Nitrophenol	Aqueous/µg/l	ND	6/7		1 - 132		R (e)
97.02014	LCS 7/15/97	8270	1,2,4-Trichlorophenol	Aqueous/µg/l	ND	40/36		44 - 142		UJ
	BS-004P-97-3	8270	1,2,4-Trichlorophenol	Aqueous/µg/l	ND	32/40		44 - 142		UJ
			Acenaphthene		ND	44/48		47 - 145		UJ

Table 2

Spike Recoveries and RPDs Outside of Laboratory Acceptable Limits
Seattle ANGS, Seattle, Washington

Data Package	QC Sample ID (a)	Analytical Method	Analyte	Matrix/Units	Reported Concentration in Unspiked Sample	% Recovery (MS/MSD or LCS/LCSD)	Control Limit (%) RPD	Control Limit (%) Spike	Control Limit (%) RPD	ERM Qualifier*
97.02029	LCS 7/15/97	8270	1,2,4-Trichlorophenol	Aqueous/µg/l	ND	39/37		44 - 142		UJ
	LCS 7/16/97	8270	4-Nitrophenol	Aqueous/µg/l	ND	<1		1 - 132		R
			Pentachlorophenol		ND	<1		14 - 176		R

Key:
RPD - Relative Percent Difference
MS/MSD - Matrix Spike/Matrix Spike duplicate
LCS/LCSD - Laboratory control sample/laboratory control sample duplicate
QC - Quality control
ERM - Environmental Resources Management
J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R - The sample data point is rejected due to deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the target analyte cannot be verified.
6010/7000 - USEPA Method 6010/7000 (metals)
8270 - USEPA Method 8270 (semivolatile organic compounds)
* Data qualifiers applied to affected sample data points in the associated sample delivery groups.
(a) - Includes samples selected as matrix spike, matrix spike duplicate, laboratory control sample, and/or laboratory control sample duplicate.
(b) - Matrix spike results were reported in both data packages.
(c) - Previously qualified as "UJ" based on percent recovery results for QC sample SB-8-9.
(d) - Not qualified, since upper control limit exceedance should cause a positive bias, but seleuium was not detected in the unspiked sample.
(e) - The data were rejected based on the extremely low (<10%) spike recoveries reported.
mg/l - milligrams per liter
ug/l - micrograms per liter
mg/kg - milligrams per kilogram

below the lower control limit. The target compounds associated with this internal standard were qualified "UJ," estimated detection limit. With the above-noted exception, the sample internal standard responses and retention times indicate minimal matrix interference and acceptable sample quantitation.

Surrogate Spikes

Surrogate spikes are compounds that are chemically similar to target compounds but are not target compounds. The laboratory added surrogate spikes to each of the samples submitted for organic analysis to monitor potential interferences from the matrix. Whereas the MS sample monitors matrix interference in only those samples that are spiked with target compounds, the surrogate spike monitors potential matrix interferences in each sample analyzed. Surrogates were added to the sample aliquot during the preparation of the sample for analysis. Surrogate recoveries were compared to the laboratory-generated or method-prescribed limits of acceptance. All of the surrogate recoveries were within acceptable limits with the exception of the samples/surrogates listed on Table 3.

Following the USEPA Functional Guidelines, SVOC results with more than one surrogate recovery outside of acceptable limits were qualified. Semivolatile data with one surrogate recovery outside of acceptable limits were not qualified. ND results associated with surrogate recoveries below the lower control limit but above 10 percent were qualified "UJ," estimated detection limit. ND results associated with surrogate recoveries below 10 percent were qualified "R," rejected. Data were only rejected when severe matrix interference was observed in the surrogate recovery.

The majority of the surrogate recoveries were within the acceptable limits. The exceptions listed on Table 3 represent a small fraction of the data compared to the total amount of surrogate data reported. With the above-noted exceptions, the surrogate recoveries indicate minimal sample matrix interference.

Duplicate Analyses

Laboratory duplicate analyses included MSDs for organic analyses and duplicate samples for inorganic analyses. The laboratory calculated the RPD between the two detected values in the primary sample and the MSD or duplicate sample. Additionally, a portion of the field samples were

Table 3

Surrogate Recoveries Outside of Laboratory Acceptable Limits
Seattle ANGS, Seattle, Washington

Data Package	Sample ID	Analytical Method	Surrogate	Matrix	% Recovery	Control Limit (%)	ERM Qualifier*
610585	SB-10-9	8270	2-Fluorobiphenyl	Soil	30	43 - 103	(a)
97.01181	MW-3-97-2	8270	2-Fluorophenol	Aqueous	19	21 - 100	(a)
97.02014	BS-004PZ-97-3	8270	2-Fluorobiphenyl	Aqueous	38	43 - 103	UJ
			2-Fluorophenol		19	21 - 100	UJ
	MW-5-97-3	8270	Phenol-d5	Aqueous	3	10 - 94	R
			2-Fluorophenol		<1	21 - 100	R
			Tribromophenol		5	10 - 123	R
	MW-5-97-3 dup	8270	Phenol-d5	Aqueous	<1	10 - 94	R
			2-Fluorophenol		<1	21 - 100	R
			Tribromophenol		<1	10 - 123	R

Key:
ERM - Environmental Resources Management
R - The sample data point is rejected due to deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the target analyte cannot be verified.
J - The target analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
UJ - The target analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
8270 - USEPA Method 8270 (semivolatile organic compounds)
* Data qualifiers applied to the data points for the associated fraction(s) in the affected sample.
(a) - Following USEPA Functional Guidelines, semivolatile organic compound data were only qualified when two or more surrogate recoveries were outside of acceptable limits.

collected in duplicate and submitted for analysis. An RPD was calculated for each of the reported detections in the primary and field duplicate sample pairs. The RPDs were within acceptable limits with the exception of the results listed on Tables 2 and 4.

The majority of the RPDs were within the acceptable limits. Field duplicate data with elevated RPDs (≥30 percent) were qualified as estimated, "J." In two cases, a non-detect primary sample result was qualified "UJ," estimated detection limit, based on a positive detection in the duplicate sample. MS/MSD samples with RPDs above the laboratory's acceptable RPD limit were qualified as estimated detection limit, "UJ." The exceptions listed on Tables 2 and 4 represent a small fraction of the data compared to the total amount of calculated RPDs reported. The calculated RPDs indicate minimal matrix heterogeneity in the samples collected for this investigation.

Interference Check Sample

The ICP ICS verifies the laboratory's interelement and background correction factors for ICP metal analyses. The ICS consists of two solutions: solution A and solution AB. Solution A consists of the known elements that can cause an interference (aluminum, calcium, iron, and magnesium), and solution AB consists of the analytes of interest mixed with the interferents. An ICS analysis consists of analyzing both solutions consecutively (starting with solution A) for all wavelengths used to quantify each analyte reported by the ICP.

The ICS and raw sample results were reviewed for possible interelement interference problems. None of the sample results required qualification based on anomalous interferent concentrations or misidentification of interferents; however, the Level IV soil sample results were qualified based on a laboratory error. The laboratory inadvertently analyzed the ICS solution A associated with the soil samples reported in the Level IV data package at a 10 to 1 dilution. Because the potential level of interference from the known interferents could not be adequately assessed, the associated ICP data were qualified "J," estimated.

TPH Evaluation

The chromatograms provided in the validatable data packages were compared against the appropriate TPH standard chromatogram. The laboratory provided copies of chromatograms for most project samples

Table 4

Field Duplicate Sample Results and Qualifiers for Detected Analytes
Seattle ANGS, Seattle, Washington

Data Package	Sample ID	Detected Analyte	Matrix/ Units	Detection Limit	Primary Sample Concentration	Duplicate Sample Concentration	RPD	ERM Qualifier*
610574	SB-6-9	Arsenic	Soil/ mg/kg	0.5	ND	2.7	NA	UJ/J
		Chromium		1	9	15	50	J
		Copper		1	5	9	57	J
		Lead		5	8	11	32	J
		Nickel		2	4	7	55	J
		Zinc		1	14	19	30	J
610602	MW-3-96-1	Acetone	Aqueous/ µg/l	10	18	20	11	
610585	SB-9-3	Arsenic	Soil/ mg/kg	0.5	12.2	20	48	J
		Chromium		1	13	16	21	
		Copper		1	21	28	29	
		Lead		5	76	245	105	J (a)
		Nickel		2	10	14	33	J (b)
		Zinc		1	42	209	133	J (b)
97.00165	MW-2-97-1	Copper	Aqueous/ mg/l	0.005	0.01	0.011	10	
		Nickel		0.005	0.02	0.021	5	
97.01181	MW-5-97-2	Nickel	Aqueous/ µg/l	5	8	7	13	
		cis-1,2-Dichloroethene		1	1.4	1.6	13	
97.02014	MW-5-97-3	Mercury	Aqueous/ µg/l	0.2	ND	0.2	NA	UJ/J
		Nickel		5	8	8	0	
		Zinc		5	39	11	112	J
		cis-1,2-Dichloroethene		1	3.5	2.8	22	
		Trichloroethene		1	2.1	ND	NA	J/UJ

Key:
ERM - Environmental Resources Management
J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
RPD - Relative Percent Difference
ND - Not detected above the reported sample quantitation limit.
NA - Not applicable.
* Data qualifiers applied to affected sample data points in the associated sample delivery groups.
(a) - This result was also qualified based on inductively coupled plasma serial dilution results.
(b) - This result was also qualified based on interference-check-sample results.
mg/l - milligrams per liter
ug/l - micrograms per liter
mg/kg - milligrams per kilogram

(including rinsate blanks and field blanks) that had positive detections of TPH. The rinsate and field blank detections and associated sample detections may have been caused by laboratory contamination that was misidentified by the laboratory as TPH.

Completeness Review

The amount of valid, useable data that were not rejected as a result of the analytical data review and validation was compared to the amount of useable data that would have been obtained if none of the results were rejected. The completeness for aqueous VOC data is 99.9 percent and the completeness for soil VOC data is 100 percent. Less than one percent of the aqueous VOC data were rejected based on unacceptable %D between the CCV and ICV results for 2-chloroethylvinyl ether. The completeness for aqueous SVOC data is 98.7 percent and the completeness for soil SVOC data is 100 percent. Less than two percent of the aqueous SVOC data were rejected based on low surrogate or target compound spike recoveries. The completeness for each of the other parameters analyzed during the RI is 100 percent. The project completeness goal of 90 percent was thus met for this investigation.

Overall Assessment

A small portion of the VOC and SVOC data was rejected, "R." These data were rejected due to elevated %D for CCV standards (VOC data) and severe matrix interferences observed in spike or surrogate recoveries (SVOC data). Rejected data should not be used for decision-making purposes as the results are not considered reliable. Data qualified as "J" or "UJ" can be used for decision-making purposes; however, the limitation identified by the applied qualifier (i.e., estimated value) should be kept in mind when using these data. All other analytical data obtained during the Seattle ANGS RI are considered acceptable for decision-making purposes without limitation.

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Date Validation
for # 610585

KCSlip4 39648

SEA406178

DATA VALIDATION REPORT FOR SEMIVOLATILE ORGANIC COMPOUND ANALYTICAL RESULTS FOR SAMPLES COLLECTED ON OCTOBER 16, 1996, FROM THE SEATTLE AIR NATIONAL GUARD STATION IN SEATTLE, WASHINGTON

AMERICAN ENVIRONMENTAL NETWORK LABORATORY - DURHAM, OREGON
WORK ORDER NO. 610585

Prepared for
Air National Guard

April 1997

ERM File: 610585 SVOA Seattle

NARRATIVE

Environmental Resources Management (ERM) collected eight soil samples, one duplicate sample, and one equipment rinsate blank from the Air National Guard Station in Seattle, Washington, on October 16, 1996. The samples were relinquished by ERM to the laboratory courier under documented chain of custody on October 16, 1996, for transport to American Environmental Network (AEN) Laboratory in Durham, Oregon.

The samples included in the validatable data package for this sample delivery group (SDG) were characterized as follows:

ERM Sample ID	Laboratory Sample ID	Level/ Matrix	Date Collected
SB-8-3	610585-1	low/soil	10/16/96
SB-8-9	610585-4	low/soil	10/16/96
SB-9-3	610585-5	low/soil	10/16/96
SB-9-3*	610585-6	low/soil	10/16/96
SB-9-9	610585-9	low/soil	10/16/96
SB-10-3	610585-10	low/soil	10/16/96
SB-10-9	610585-13	low/soil	10/16/96
SB-10-9*	610585-14	low/water	10/16/96
SB-11-3	610585-15	low/soil	10/16/96
SB-11-9	610585-18	low/soil	10/16/96

AEN chose sample SB-8-9 for the matrix spike/matrix spike duplicate sample pair. Sample SB-9-3* was the duplicate soil sample, and sample SB-10-9* was the equipment rinsate blank.

Semivolatile organic compound data were acquired according to the USEPA SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, "Method 8270" (November 1986, Third Edition, Volume 1B, Revision 2, September 1994).

Validation of these data were based on the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review* (Office of Solid Waste and Emergency Response, Publication 9240.1-05, PB94-9635-1, EPA-540/R-94/012, US Environmental Protection Agency, Washington, D. C., February 1993). (Organic Functional Guidelines).

The areas reviewed during the data validation procedure are listed below:

I. Sample Preservation and Holding Times

II. GC/MS Instrument Performance Check

III. Initial Calibration

IV. Continuing Calibration

V. Blanks

VI. Surrogate Spikes

VII. Matrix Spike/Matrix Spike Duplicates

VIII. Laboratory Control Samples

IX. Regional Quality Assurance and Quality Control

X. Internal Standards

XI. Target Compound Identification

XII. Compound Quantitation and Contract Required Quantitation Limits (CRQLs)

XIII. Tentatively Identified Compounds

XIV. System Performance

XV. Field Duplicates

XVI. Overall Assessment of Data

XVII. Documentation

All laboratory results have been accepted (unqualified), qualified, or rejected.

- Unqualified results are valid for the specified procedures and may be used without reservations.
- Qualified results are usable with the indicated limitation.
- Rejected results are unusable. The analyte may or may not be present. Resampling and reanalysis will be necessary for verification.

Qualified and rejected results are annotated in accordance with the Organic Functional Guidelines using the following codes:

U	The analyte was analyzed for but was not detected above the reported value.
J	The reported value is an estimate.
R	The data are unusable. The presence or absence of the analyte cannot be verified from the existing data. Resampling and reanalysis are necessary for verification.
N	There is presumptive evidence to make a tentative identification.
NJ	There is presumptive evidence to make a tentative identification; the reported value is an estimate.
UJ	The analyte was analyzed for but was not detected above the reported value; the reported value is an estimate.

DATA VALIDATION RESULTS

I. SAMPLE PRESERVATION AND HOLDING TIMES

AEN provided ERM with 1-liter amber glass sample containers. The water samples were extracted within the 7-day holding time specified by Method 8270, and the resultant sample extracts were analyzed within the specified 40-day holding time from the date of extraction.

Each soil sample was extracted within the specified 14-day holding time from the date of collection, and the resultant sample extracts were analyzed within the specified 40-day holding time from the date of extraction.

No data were qualified or rejected based on improper sample preservation or exceedance of specified holding times.

II. GC/MS INSTRUMENT PERFORMANCE CHECK

Compliance with the decafluorotriphenylphosphine (DFTPP) instrument tuning criteria was demonstrated for each GC/MS used at the beginning of each 12-hour shift during which standards, samples, or associated quality control samples were analyzed.

All semivolatile organic compound analytical work was performed on one GC/MS instrument.

DFTPP ion abundance criteria were met as follows:

GC/MS Instrument ID	Date	Time
Heisenberg	10/26/96	1021
	10/28/96	1802
	10/30/96	0240
	10/30/96	2158
	10/30/96	0912

No data were qualified or rejected based on instrument tuning.

III. INITIAL CALIBRATION

The GC/MS employed for samples and associated quality control samples was calibrated at five concentration levels. Each calibration standard contained all target compounds, surrogates, and internal standards.

The initial calibrations are summarized below:

GC/MS Instrument ID	Date	Time
Heisenberg	10/26/96 10/30/96	1307 - 1850 0308 - 0525

Method 8270 does not specify minimum relative response factors (RRF) for each target compound; a minimum RRF of 0.05 was used to evaluate the sensitivity and response of the instrument to each target compound. All RRFs for target compounds and surrogates were greater than or equal to 0.05. No data were qualified or rejected based on the RRFs for these initial calibrations.

All percent relative standard deviations (%RSD) were less than or equal to 30 percent, with the following exception:

Date	Target Compounds	%RSD
10/26/96	Hexachlorocyclopentadiene	30.7

This compound was not detected in the associated samples analyzed on 10/28/96; each result for this compound in the associated samples was qualified as estimated detection limit, "UJ."

IV. CONTINUING CALIBRATION

The GC/MS was calibrated for each subsequent 12-hour shift during which samples or associated quality control samples in this SDG were analyzed. Each continuing calibration was performed at one concentration level with a standard containing all target compounds, surrogates, and internal standards.

The continuing calibrations are summarized below:

GC/MS Instrument ID	Date	Time
Heisenberg	10/28/96	1826
	10/30/96	2227
	11/01/96	0941

All RRFs for target compounds and surrogates were greater than or equal to 0.05. No data were qualified or rejected based on the RRFs for these continuing calibrations.

Percent differences (%D) for all target compounds were between 0 and 25 percent, with the following exceptions:

Date	Time	Compound	% D
10/28/96	1826	bis(2-Chloroisopropyl)ether	26.4
		Hexahclorocyclopentadiene	-52.9
		4,6-Dinitro-2-methylphenol	-126.7
10/30/96	2227	Benzidine	37.3
11/01/96	0941	Benzidine	63.5

None of these target compounds were detected in the associated samples. Nondetects for these compounds in the associated samples were qualified as estimated detection limit, "UJ."

V. BLANKS

The following method blanks were associated with this SDG:

Blank ID	Level/ Matrix	Date Extracted	GC/MS Instrument ID	Analysis Date	Time
1021-BLK	low/water	10/21/96	Heisenberg	10/28/96	1242
1030-BLK	low/soil	10/30/96	Heisenberg	10/31/96	0150

No target compounds were reported in these blanks.

The following equipment rinsate blank was associated with this SDG:

ERM Sample ID	Level/ Matrix	Date Extracted	GC/MS Instrument ID	Analysis Date	Time
SB-10-9-3*	low/water	10/21/96	Heisenberg	10/28/96	1935

No target compounds were reported in this blank.

No data were qualified or rejected based on the method or equipment blank results.

VI. SURROGATE SPIKES

All surrogate percent recoveries (%R) were within the specified quality control limits, with the following exceptions:

ERM Sample ID	Surrogate	% R	Control Limits %R
1126-BLK	2-Fluorophenol	42	43 - 116
SB-8-3*	2-Fluorobiphenyl	37	43 - 116

The Organic Functional Guidelines allow one semivolatile organic compound surrogate recovery per sample to be outside acceptable limits before data must be qualified. Following this guideline, and because both of the above-listed samples were also quality control samples, no data were qualified or rejected based on surrogate spike recoveries.

VII. MATRIX SPIKE AND MATRIX SPIKE DUPLICATES

The following matrix spike/matrix spike duplicate (MS/MSD) sample pair was associated with the samples in this SDG:

ERM Sample ID	Level/ Matrix	Date Extracted	GC/MS Instrument ID	Analysis Date	Time
SB-8-9MS	low/soil	10/30/96	Heisenberg	10/31/96	0406
SB-8-9MSD	low/soil	10/30/96	Heisenberg	10/31/96	0440

The MS/MSD %Rs and relative percent differences (RPD) were within specified quality control limits; therefore, no data were qualified or rejected based on MS/MSD %Rs or RPDs.

VIII. LABORATORY CONTROL SAMPLES

The following laboratory control sample/laboratory control sample duplicate (LCS/LCSD) pairs were associated with the samples analyzed for semivolatile organic compounds in this SDG:

Sample ID	Level/ Matrix	Date Extracted	GC/MS Instrument ID	Analysis Date	Time
WBS 102196	low/water	10/21/96	Heisenberg	10/28/96	0116
WBSD 102197	low/water	10/21/96	Heisenberg	10/28/96	0150
SBS 103097	low/soil	10/30/96	Heisenberg	10/31/96	0224
SBSD 103097	low/soil	10/30/96	Heisenberg	10/31/96	0258

The LCS/LCSD %Rs and RPDs were within specified quality control limits; therefore, no data were qualified or rejected based on LCS/LCSD %Rs or RPDs.

IX. REGIONAL QUALITY ASSURANCE AND QUALITY CONTROL

No USEPA regional quality assurance and quality control samples were required for this investigation; these samples are typically required only for USEPA Superfund investigations.

X. INTERNAL STANDARDS

All internal standard area counts and retention times were within 50 to 200 percent and ±30 seconds, respectively, of those in the associated initial calibration standard midpoint. No data were qualified or rejected based on internal standard response.

XI. TARGET COMPOUND IDENTIFICATION

All target compound identifications were acceptable with regard to the supporting analytical data.

XII. COMPOUND QUANTITATION AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQLs)

All target compound quantitations were acceptable with regard to the supporting analytical data. The laboratory's practical quantitation limits met the CRQLs listed in the project Quality Assurance Project Plan.

XIII. TENTATIVELY IDENTIFIED COMPOUNDS (TICs)

No TICs were reported in this SDG.

XIV. SYSTEM PERFORMANCE

No marked changes were observed in instrument performance during the analysis of the samples in this SDG, as determined by the validation.

XV. FIELD DUPLICATES

The field duplicate sample results in this SDG agreed with the associated primary sample results. Both the primary and field duplicate results were ND for each of the target compounds. These results indicate minimal heterogeneity in the sample matrix.

XVI. OVERALL ASSESSMENT OF DATA

The Validated Data section of this report provides the semivolatile organic compound analysis data sheets for this SDG which include all data validation qualifiers applied by ERM.

Fifteen non-detect data points for four target compounds were qualified as estimated detection limit, "UJ." No data were rejected.

XVII. DOCUMENTATION

The data package deliverables and analytical requirements specified in the SW-846 method protocols were met for this data set.

VALIDATED DATA

This section provides the semivolatile organic compound analysis data sheets with the data validation qualifiers applied by ERM (22 sheets total).

METHOD:	EPA 8270	AEN I.D.:	610585-14
CLIENT I.D.:	SB-10-9*	DATE SAMPLED:	10/16/96
CLIENT:	ERM-West, Inc.	DATE RECEIVED:	10/17/96
PROJECT #:	6032.20	DATE EXTRACTED:	10/21/96
PROJECT NAME:	Seattle ANGS	DATE ANALYZED:	10/28/96
SAMPLE MATRIX:	WATER	DILUTION FACTOR:	1
		UNITS:	ug/L

PARAMETER	RESULTS	
Acenaphthene	< 10	
Acenaphthylene	< 10	
Aniline	< 10	
Anthracene	< 10	
Benzidine	< 100	
Benzo(a)anthracene	< 10	
Benzo(b)fluoranthene	< 10	
Benzo(k)fluoranthene	< 10	
Benzo(g,h,i)perylene	< 10	
Benzo(a)pyrene	< 10	
Benzoic Acid	< 50	
Benzyl Alcohol	< 10	
Bis(2-chloroethoxy)methane	< 10	
Bis(2-chloroethyl) ether	< 10	
Bis(2-chloroisopropyl) ether	< 10	US
Bis(2-ethylhexyl)phthalate	< 20	
4-Bromophenyl phenyl ether	< 10	
Butyl benzyl phthalate	< 10	
4-Chloroaniline	< 10	
4-Chloro-3-methylphenol	< 10	
2-Chloronaphthalene	< 10	
2-Chlorophenol	< 10	
4-Chlorophenyl phenyl ether	< 10	
Chrysene	< 10	
Dibenzofuran	< 10	
Dibenzo(a,h)anthracene	< 10	
Di-n-butyl phthalate	< 10	
1,2-Dichlorobenzene	< 10	
1,3-Dichlorobenzene	< 10	
1,4-Dichlorobenzene	< 10	
3,3'-Dichlorobenzidine	< 50	
2,4-Dichlorophenol	< 10	
Diethyl phthalate	< 10	
2,4-Dimethylphenol	< 10	
Dimethyl phthalate	< 10	
4,6-Dinitro-2-methylphenol	< 50	US
2,4,-Dinitrophenol	< 50	
2,4-Dinitrotoluene	< 10	
2,6-Dinitrotoluene	< 10	
Di-n-octyl phthalate	< 10	

Analyst: [illegible] 11/1/96

Reviewer CE 11/4/96

KCSlip4 39660

METHOD:	EPA 8270	AEN I.D.:	610585-14
CLIENT I.D.:	SB-10-9*	DATE SAMPLED:	10/16/96
CLIENT:	ERM-West, Inc.	DATE RECEIVED:	10/17/96
PROJECT #:	6032.20	DATE EXTRACTED:	10/21/96
PROJECT NAME:	Seattle ANGS	DATE ANALYZED:	10/28/96
SAMPLE MATRIX:	WATER	DILUTION FACTOR:	1
		UNITS:	ug/L

PARAMETER	RESULTS
Fluoranthene	< 10
Fluorene	< 10
Hexachlorobenzene	< 10
Hexachlorobutadiene	< 10
Hexachlorocyclopentadiene	< 10 UJ
Hexachloroethane	< 10
Indeno(1,2,3-cd)pyrene	< 10
Isophorone	< 10
2-Methylnaphthalene	< 10
2-Methylphenol	< 10
4-Methylphenol	< 10
Naphthalene	< 10
2-Nitroaniline	< 10
3-Nitroaniline	< 10
4-Nitroaniline	< 10
Nitrobenzene	< 10
2-Nitrophenol	< 10
4-Nitrophenol	< 50
N-Nitrosodimethylamine	< 10
N-Nitroso-di-n-propylamine	< 10
N-Nitrosodiphenylamine	< 10
Pentachlorophenol	< 50
Phenanthrene	< 10
Phenol	< 10
Pyrene	< 10
2,3,4,6-Tetrachlorophenol	< 10
1,2,4-Trichlorobenzene	< 10
2,4,6-Trichlorophenol	< 10
2,4,5-Trichlorophenol	< 50

SURROGATES:

	RECOVERY	CONTROL LIMITS
2-FLUOROPHENOL	58%	21%-100%
PHENOL-D6	36%	10%-100%
2,4,6-TRIBROMOPHENOL	109%	10%-123%
2-FLUOROBIPHENYL	91%	43%-116%
NITROBENZENE-D5	98%	35%-114%
TERPHENYL-D14	101%	33%-124%

Analyst: [signature] 11/1/96

Reviewer: [signature] 11/4/96

KCSlip4 39661

SEA406191

METHOD:	EPA 8270	AEN I.D.:	610585-23
CLIENT I.D.:	SB-11-9*	DATE SAMPLED:	10/16/96
CLIENT:	ERM-West, Inc.	DATE RECEIVED:	10/17/96
PROJECT #:	6032.20	DATE EXTRACTED:	10/21/96
PROJECT NAME:	Seattle ANGS	DATE ANALYZED:	10/28/96
SAMPLE MATRIX:	WATER	DILUTION FACTOR:	1
		UNITS:	ug/L

PARAMETER	RESULTS	
Acenaphthene	< 10	
Acenaphthylene	< 10	
Aniline	< 10	
Anthracene	< 10	
Benzidine	< 100	
Benzo(a)anthracene	< 10	
Benzo(b)fluoranthene	< 10	
Benzo(k)fluoranthene	< 10	
Benzo(g,h,i)perylene	< 10	
Benzo(a)pyrene	< 10	
Benzoic Acid	< 50	
Benzyl Alcohol	< 10	
Bis(2-chloroethoxy)methane	< 10	
Bis(2-chloroethyl) ether	< 10	
Bis(2-chloroisopropyl) ether	< 10	UJ
Bis(2-ethylhexyl)phthalate	< 20	
4-Bromophenyl phenyl ether	< 10	
Butyl benzyl phthalate	< 10	
4-Chloroaniline	< 10	
4-Chloro-3-methylphenol	< 10	
2-Chloronaphthalene	< 10	
2-Chlorophenol	< 10	
4-Chlorophenyl phenyl ether	< 10	
Chrysene	< 10	
Dibenzofuran	< 10	
Dibenzo(a,h)anthracene	< 10	
Di-n-butyl phthalate	< 10	
1,2-Dichlorobenzene	< 10	
1,3-Dichlorobenzene	< 10	
1,4-Dichlorobenzene	< 10	
3,3'-Dichlorobenzidine	< 50	
2,4-Dichlorophenol	< 10	
Diethyl phthalate	< 10	
2,4-Dimethylphenol	< 10	
Dimethyl phthalate	< 10	
4,6-Dinitro-2-methylphenol	< 50	UJ
2,4,-Dinitrophenol	< 50	
2,4-Dinitrotoluene	< 10	
2,6-Dinitrotoluene	< 10	
Di-n-octyl phthalate	< 10	

Analyst: [illegible] 11/1/96

Reviewer: [illegible] 11/4/96

KCSlip4 39662

SEA406192

METHOD:	EPA 8270	AEN I.D.:	610585-23
CLIENT I.D.:	SB-11-9*	DATE SAMPLED:	10/16/96
CLIENT:	ERM-West, Inc.	DATE RECEIVED:	10/17/96
PROJECT #:	6032.20	DATE EXTRACTED:	10/21/96
PROJECT NAME:	Seattle ANGS	DATE ANALYZED:	10/28/96
SAMPLE MATRIX:	WATER	DILUTION FACTOR:	1
		UNITS:	ug/L

PARAMETER	RESULTS
Fluoranthene	< 10
Fluorene	< 10
Hexachlorobenzene	< 10
Hexachlorobutadiene	< 10
Hexachlorocyclopentadiene	< 10 U3
Hexachloroethane	< 10
Indeno(1,2,3-cd)pyrene	< 10
Isophorone	< 10
2-Methylnaphthalene	< 10
2-Methylphenol	< 10
4-Methylphenol	< 10
Naphthalene	< 10
2-Nitroaniline	< 10
3-Nitroaniline	< 10
4-Nitroaniline	< 10
Nitrobenzene	< 10
2-Nitrophenol	< 10
4-Nitrophenol	< 50
N-Nitrosodimethylamine	< 10
N-Nitroso-di-n-propylamine	< 10
N-Nitrosodiphenylamine	< 10
Pentachlorophenol	< 50
Phenanthrene	< 10
Phenol	< 10
Pyrene	< 10
2,3,4,6-Tetrachlorophenol	< 10
1,2,4-Trichlorobenzene	< 10
2,4,6-Trichlorophenol	< 10
2,4,5-Trichlorophenol	< 50

SURROGATES:

	RECOVERY	CONTROL LIMITS
2-FLUOROPHENOL	58%	21%-100%
PHENOL-D6	36%	10%-100%
2,4,6-TRIBROMOPHENOL	100%	10%-123%
2-FLUOROBIPHENYL	82%	43%-116%
NITROBENZENE-D5	89%	35%-114%
TERPHENYL-D14	93%	33%-124%

Analyst: pm 11/1/96

Reviewer: CE 11/4/96

Environmental Network, Inc.

KCSlip4 39663

SEA406193

METHOD:	EPA 8270	AEN I.D.:	610585-1
CLIENT I.D.:	SB-8-3	DATE SAMPLED:	10/16/96
CLIENT:	ERM-West, Inc.	DATE RECEIVED:	10/17/96
PROJECT #:	6032.20	DATE EXTRACTED:	10/30/96
PROJECT NAME:	Seattle ANGS	DATE ANALYZED:	10/31/96
SAMPLE MATRIX:	SOIL	DILUTION FACTOR:	1
		UNITS:	mg/kg

RESULTS CORRECTED FOR MOISTURE CONTENT

PARAMETER	RESULTS
Acenaphthene	< 0.33
Acenaphthylene	< 0.33
Aniline	< 0.33
Anthracene	< 0.33
Benzidine	< 0.33 UJ
Benzo(a)anthracene	< 0.33
Benzo(b)fluoranthene	< 0.33
Benzo(k)fluoranthene	< 0.33
Benzo(g,h,i)perylene	< 0.33
Benzo(a)pyrene	< 0.33
Benzoic Acid	< 1.7
Benzyl Alcohol	< 0.33
Bis(2-chloroethoxy)methane	< 0.33
Bis(2-chloroethyl) ether	< 0.33
Bis(2-chloroisopropyl) ether	< 0.33
Bis(2-ethylhexyl)phthalate	< 0.33
4-Bromophenyl phenyl ether	< 0.33
Butyl benzyl phthalate	< 0.33
4-Chloroaniline	< 0.33
4-Chloro-3-methylphenol	< 0.33
2-Chloronaphthalene	< 0.33
2-Chlorophenol	< 0.33
4-Chlorophenyl phenyl ether	< 0.33
Chrysene	< 0.33
Dibenzofuran	< 0.33
Dibenzo(a,h)anthracene	< 0.33
Di-n-butyl phthalate	< 0.33
1,2-Dichlorobenzene	< 0.33
1,3-Dichlorobenzene	< 0.33
1,4-Dichlorobenzene	< 0.33
3,3'-Dichlorobenzidine	< 1.7
2,4-Dichlorophenol	< 0.33
Diethyl phthalate	< 0.33
2,4-Dimethylphenol	< 0.33
Dimethyl phthalate	< 0.33
4,6-Dinitro-2-methylphenol	< 1.7
2,4-Dinitrophenol	< 1.7
2,4-Dinitrotoluene	< 0.33
2,6-Dinitrotoluene	< 0.33
Di-n-octyl phthalate	< 0.33

Analyst: [illegible] 11/4/96

Reviewer: GS 11/4/96

KCSlip4 39664

SEA406194

METHOD:	EPA 8270	AEN I.D.:	610585-1
CLIENT I.D.:	SB-8-3	DATE SAMPLED:	10/16/96
CLIENT:	ERM-West, Inc.	DATE RECEIVED:	10/17/96
PROJECT #:	6032.20	DATE EXTRACTED:	10/30/96
PROJECT NAME:	Seattle ANGS	DATE ANALYZED:	10/31/96
SAMPLE MATRIX:	SOIL	DILUTION FACTOR:	1
		UNITS:	mg/kg

RESULTS CORRECTED FOR MOISTURE CONTENT

PARAMETER	RESULTS
Fluoranthene	< 0.33
Fluorene	< 0.33
Hexachlorobenzene	< 0.33
Hexachlorobutadiene	< 0.33
Hexachlorocyclopentadiene	< 0.33
Hexachloroethane	< 0.33
Indeno(1,2,3-cd)pyrene	< 0.33
Isophorone	< 0.33
2-Methylnaphthalene	< 0.33
2-Methylphenol	< 0.33
4-Methylphenol	< 0.33
Naphthalene	< 0.33
2-Nitroaniline	< 0.33
3-Nitroaniline	< 0.33
4-Nitroaniline	< 0.33
Nitrobenzene	< 0.33
2-Nitrophenol	< 0.33
4-Nitrophenol	< 1.7
N-Nitrosodimethylamine	< 0.33
N-Nitroso-di-n-propylamine	< 0.33
N-Nitrosodiphenylamine	< 0.33
Pentachlorophenol	< 1.7
Phenanthrene	< 0.33
Phenol	< 0.33
Pyrene	< 0.33
2,3,4,6-Tetrachlorophenol	< 0.33
1,2,4-Trichlorobenzene	< 0.33
2,4,5-Trichlorophenol	< 0.33
2,4,6-Trichlorophenol	< 1.7

SURROGATES:

	RECOVERY	CONTROL LIMITS (%)
2-FLUOROPHENOL	57%	37 - 102
PHENOL-D6	76%	46 - 122
2,4,6-TRIBROMOPHENOL	96%	35 - 149
2-FLUOROBIPHENYL	65%	43 - 103
NITROBENZENE-D5	55%	38 - 112
TERPHENYL-D14	93%	49 - 105

Analyst: pm 11/6/96

Reviewer: CE 11/4/96

METHOD:	EPA 8270	AEN I.D.:	610585-4
CLIENT I.D.:	SB-8-9	DATE SAMPLED:	10/16/96
CLIENT:	ERM-West, Inc.	DATE RECEIVED:	10/17/96
PROJECT #:	6032.20	DATE EXTRACTED:	10/30/96
PROJECT NAME:	Seattle ANGS	DATE ANALYZED:	10/31/96
SAMPLE MATRIX:	SOIL	DILUTION FACTOR:	1
		UNITS:	mg/kg

RESULTS CORRECTED FOR MOISTURE CONTENT

PARAMETER	RESULTS
Acenaphthene	< 0.48
Acenaphthylene	< 0.48
Aniline	< 0.48
Anthracene	< 0.48
Benzidine	< 0.48 UJ
Benzo(a)anthracene	< 0.48
Benzo(b)fluoranthene	< 0.48
Benzo(k)fluoranthene	< 0.48
Benzo(g,h,i)perylene	< 0.48
Benzo(a)pyrene	< 0.48
Benzoic Acid	< 2.5
Benzyl Alcohol	< 0.48
Bis(2-chloroethoxy)methane	< 0.48
Bis(2-chloroethyl) ether	< 0.48
Bis(2-chloroisopropyl) ether	< 0.48
Bis(2-ethylhexyl)phthalate	< 0.48
4-Bromophenyl phenyl ether	< 0.48
Butyl benzyl phthalate	< 0.48
4-Chloroaniline	< 0.48
4-Chloro-3-methylphenol	< 0.48
2-Chloronaphthalene	< 0.48
2-Chlorophenol	< 0.48
4-Chlorophenyl phenyl ether	< 0.48
Chrysene	< 0.48
Dibenzofuran	< 0.48
Dibenzo(a,h)anthracene	< 0.48
Di-n-butyl phthalate	< 0.48
1,2-Dichlorobenzene	< 0.48
1,3-Dichlorobenzene	< 0.48
1,4-Dichlorobenzene	< 0.48
3,3'-Dichlorobenzidine	< 2.5
2,4-Dichlorophenol	< 0.48
Diethyl phthalate	< 0.48
2,4-Dimethylphenol	< 0.48
Dimethyl phthalate	< 0.48
4,6-Dinitro-2-methylphenol	< 2.5
2,4,-Dinitrophenol	< 2.5
2,4-Dinitrotoluene	< 0.48
2,6-Dinitrotoluene	< 0.48
Di-n-octyl phthalate	< 0.48

Analyst: [signature] 11/26/97

Reviewer: [signature] 11/23/97

American Environmental Network, Inc.

KCSlip4 39666

SEA406196

METHOD:	EPA 8270	**AEN I.D.:**	610585-4
CLIENT I.D.:	SB-8-9	**DATE SAMPLED:**	10/16/96
CLIENT:	ERM-West, Inc.	**DATE RECEIVED:**	10/17/96
PROJECT #:	6032.20	**DATE EXTRACTED:**	10/30/96
PROJECT NAME:	Seattle ANGS	**DATE ANALYZED:**	10/31/96
SAMPLE MATRIX:	SOIL	**DILUTION FACTOR:**	1
		UNITS:	mg/kg

RESULTS CORRECTED FOR MOISTURE CONTENT

PARAMETER	RESULTS
Fluoranthene	< 0.48
Fluorene	< 0.48
Hexachlorobenzene	< 0.48
Hexachlorobutadiene	< 0.48
Hexachlorocyclopentadiene	< 0.48
Hexachloroethane	< 0.48
Indeno(1,2,3-cd)pyrene	< 0.48
Isophorone	< 0.48
2-Methylnaphthalene	< 0.48
2-Methylphenol	< 0.48
4-Methylphenol	< 0.48
Naphthalene	< 0.48
2-Nitroaniline	< 0.48
3-Nitroaniline	< 0.48
4-Nitroaniline	< 0.48
Nitrobenzene	< 0.48
2-Nitrophenol	< 0.48
4-Nitrophenol	< 2.5
N-Nitrosodimethylamine	< 0.48
N-Nitroso-di-n-propylamine	< 0.48
N-Nitrosodiphenylamine	< 0.48
Pentachlorophenol	< 2.5
Phenanthrene	< 0.48
Phenol	< 0.48
Pyrene	< 0.48
2,3,4,6-Tetrachlorophenol	< 0.48
1,2,4-Trichlorobenzene	< 0.48
2,4,6-Trichlorophenol	< 0.48
2,4,5-Trichlorophenol	< 2.5

SURROGATES:

	RECOVERY	CONTROL LIMITS (%)
2-FLUOROPHENOL	78%	37 - 102
PHENOL-D6	86%	46 - 122
2,4,6-TRIBROMOPHENOL	92%	35 - 149
2-FLUOROBIPHENYL	69%	43 - 103
NITROBENZENE-D5	79%	38 - 112
TERPHENYL-D14	89%	49 - 105

Analyst: 11/6/97

Reviewer: CE 11/25/97

American Environmental Network, Inc.

KCSlip4 39667

SEA406197

METHOD:	EPA 8270	AEN I.D.:	610585-5
CLIENT I.D.:	SB-9-3	DATE SAMPLED:	10/16/96
CLIENT:	ERM-West, Inc.	DATE RECEIVED:	10/17/96
PROJECT #:	6032.20	DATE EXTRACTED:	10/30/96
PROJECT NAME:	Seattle ANGS	DATE ANALYZED:	10/31/96
SAMPLE MATRIX:	SOIL	DILUTION FACTOR:	1
		UNITS:	mg/kg

RESULTS CORRECTED FOR MOISTURE CONTENT

PARAMETER	RESULTS
Acenaphthene	< 0.49
Acenaphthylene	< 0.49
Aniline	< 0.49
Anthracene	< 0.49
Benzidine	< 0.49 U3
Benzo(a)anthracene	< 0.49
Benzo(b)fluoranthene	< 0.49
Benzo(k)fluoranthene	< 0.49
Benzo(g,h,i)perylene	< 0.49
Benzo(a)pyrene	< 0.49
Benzoic Acid	< 2.5
Benzyl Alcohol	< 0.49
Bis(2-chloroethoxy)methane	< 0.49
Bis(2-chloroethyl) ether	< 0.49
Bis(2-chloroisopropyl) ether	< 0.49
Bis(2-ethylhexyl)phthalate	< 0.49
4-Bromophenyl phenyl ether	< 0.49
Butyl benzyl phthalate	< 0.49
4-Chloroaniline	< 0.49
4-Chloro-3-methylphenol	< 0.49
2-Chloronaphthalene	< 0.49
2-Chlorophenol	< 0.49
4-Chlorophenyl phenyl ether	< 0.49
Chrysene	< 0.49
Dibenzofuran	< 0.49
Dibenzo(a,h)anthracene	< 0.49
Di-n-butyl phthalate	< 0.49
1,2-Dichlorobenzene	< 0.49
1,3-Dichlorobenzene	< 0.49
1,4-Dichlorobenzene	< 0.49
3,3'-Dichlorobenzidine	< 2.5
2,4-Dichlorophenol	< 0.49
Diethyl phthalate	< 0.49
2,4-Dimethylphenol	< 0.49
Dimethyl phthalate	< 0.49
4,6-Dinitro-2-methylphenol	< 2.5
2,4,-Dinitrophenol	< 2.5
2,4-Dinitrotoluene	< 0.49
2,6-Dinitrotoluene	< 0.49
Di-n-octyl phthalate	< 0.49

Analyst: 11/23/97

Reviewer: CE 1/23/97

American Environmental Network, Inc.

KCSlip4 39668

SEA406198

METHOD:	EPA 8270	AEN I.D.:	610585-5
CLIENT I.D.:	SB-9-3	DATE SAMPLED:	10/16/96
CLIENT:	ERM-West, Inc.	DATE RECEIVED:	10/17/96
PROJECT #:	6032.20	DATE EXTRACTED:	10/30/96
PROJECT NAME:	Seattle ANGS	DATE ANALYZED:	10/31/96
SAMPLE MATRIX:	SOIL	DILUTION FACTOR:	1
		UNITS:	mg/kg

RESULTS CORRECTED FOR MOISTURE CONTENT

PARAMETER	RESULTS
Fluoranthene	< 0.49
Fluorene	< 0.49
Hexachlorobenzene	< 0.49
Hexachlorobutadiene	< 0.49
Hexachlorocyclopentadiene	< 0.49
Hexachloroethane	< 0.49
Indeno(1,2,3-cd)pyrene	< 0.49
Isophorone	< 0.49
2-Methylnaphthalene	< 0.49
2-Methylphenol	< 0.49
4-Methylphenol	< 0.49
Naphthalene	< 0.49
2-Nitroaniline	< 0.49
3-Nitroaniline	< 0.49
4-Nitroaniline	< 0.49
Nitrobenzene	< 0.49
2-Nitrophenol	< 0.49
4-Nitrophenol	< 2.5
N-Nitrosodimethylamine	< 0.49
N-Nitroso-di-n-propylamine	< 0.49
N-Nitrosodiphenylamine	< 0.49
Pentachlorophenol	< 2.5
Phenanthrene	< 0.49
Phenol	< 0.49
Pyrene	< 0.49
2,3,4,6-Tetrachlorophenol	< 0.49
1,2,4-Trichlorobenzene	< 0.49
2,4,6-Trichlorophenol	< 0.49
2,4,5-Trichlorophenol	< 2.5

SURROGATES:

	RECOVERY	CONTROL LIMITS (%)
2-FLUOROPHENOL	81%	37 - 102
PHENOL-D6	86%	46 - 122
2,4,6-TRIBROMOPHENOL	88%	35 - 149
2-FLUOROBIPHENYL	62%	43 - 103
NITROBENZENE-D5	82%	38 - 112
TERPHENYL-D14	93%	49 - 105

Analyst: 11/23/96

Reviewer: 11/23/96

American Environmental Network, Inc.

KCSlip4 39669

SEA406199

METHOD:	EPA 8270	AEN I.D.:	610585-6
CLIENT I.D.:	SB-9-3*	DATE SAMPLED:	10/16/96
CLIENT:	ERM-West, Inc.	DATE RECEIVED:	10/17/96
PROJECT #:	6032.20	DATE EXTRACTED:	10/30/96
PROJECT NAME:	Seattle ANGS	DATE ANALYZED:	10/31/96
SAMPLE MATRIX:	SOIL	DILUTION FACTOR:	1
		UNITS:	mg/kg

RESULTS CORRECTED FOR MOISTURE CONTENT

PARAMETER	RESULTS
Acenaphthene	< 0.48
Acenaphthylene	< 0.48
Aniline	< 0.48
Anthracene	< 0.48
Benzidine	< 0.48 UJ
Benzo(a)anthracene	< 0.48
Benzo(b)fluoranthene	< 0.48
Benzo(k)fluoranthene	< 0.48
Benzo(g,h,i)perylene	< 0.48
Benzo(a)pyrene	< 0.48
Benzoic Acid	< 2.5
Benzyl Alcohol	< 0.48
Bis(2-chloroethoxy)methane	< 0.48
Bis(2-chloroethyl) ether	< 0.48
Bis(2-chloroisopropyl) ether	< 0.48
Bis(2-ethylhexyl)phthalate	< 0.48
4-Bromophenyl phenyl ether	< 0.48
Butyl benzyl phthalate	< 0.48
4-Chloroaniline	< 0.48
4-Chloro-3-methylphenol	< 0.48
2-Chloronaphthalene	< 0.48
2-Chlorophenol	< 0.48
4-Chlorophenyl phenyl ether	< 0.48
Chrysene	< 0.48
Dibenzofuran	< 0.48
Dibenzo(a,h)anthracene	< 0.48
Di-n-butyl phthalate	< 0.48
1,2-Dichlorobenzene	< 0.48
1,3-Dichlorobenzene	< 0.48
1,4-Dichlorobenzene	< 0.48
3,3'-Dichlorobenzidine	< 2.5
2,4-Dichlorophenol	< 0.48
Diethyl phthalate	< 0.48
2,4-Dimethylphenol	< 0.48
Dimethyl phthalate	< 0.48
4,6-Dinitro-2-methylphenol	< 2.5
2,4,-Dinitrophenol	< 2.5
2,4-Dinitrotoluene	< 0.48
2,6-Dinitrotoluene	< 0.48
Di-n-octyl phthalate	< 0.48

Analyst: [illegible] 11/23/97

Reviewer: [illegible] 11/23/97

American Environmental Network, Inc.

KCSlip4 39670

SEA406200

METHOD:	EPA 8270	**AEN I.D.:**	610585-6
CLIENT I.D.:	SB-9-3*	**DATE SAMPLED:**	10/16/96
CLIENT:	ERM-West, Inc.	**DATE RECEIVED:**	10/17/96
PROJECT #:	6032.20	**DATE EXTRACTED:**	10/30/96
PROJECT NAME:	Seattle ANGS	**DATE ANALYZED:**	10/31/96
SAMPLE MATRIX:	SOIL	**DILUTION FACTOR:**	1
		UNITS:	mg/kg

RESULTS CORRECTED FOR MOISTURE CONTENT

PARAMETER	RESULTS
Fluoranthene	< 0.48
Fluorene	< 0.48
Hexachlorobenzene	< 0.48
Hexachlorobutadiene	< 0.48
Hexachlorocyclopentadiene	< 0.48
Hexachloroethane	< 0.48
Indeno(1,2,3-cd)pyrene	< 0.48
Isophorone	< 0.48
2-Methylnaphthalene	< 0.48
2-Methylphenol	< 0.48
4-Methylphenol	< 0.48
Naphthalene	< 0.48
2-Nitroaniline	< 0.48
3-Nitroaniline	< 0.48
4-Nitroaniline	< 0.48
Nitrobenzene	< 0.48
2-Nitrophenol	< 0.48
4-Nitrophenol	< 2.5
N-Nitrosodimethylamine	< 0.48
N-Nitroso-di-n-propylamine	< 0.48
N-Nitrosodiphenylamine	< 0.48
Pentachlorophenol	< 2.5
Phenanthrene	< 0.48
Phenol	< 0.48
Pyrene	< 0.48
2,3,4,6-Tetrachlorophenol	< 0.48
1,2,4-Trichlorobenzene	< 0.48
2,4,6-Trichlorophenol	< 0.48
2,4,5-Trichlorophenol	< 2.5

SURROGATES:

	RECOVERY	CONTROL LIMITS (%)
2-FLUOROPHENOL	67%	37 - 102
PHENOL-D6	81%	46 - 122
2,4,6-TRIBROMOPHENOL	91%	35 - 149
2-FLUOROBIPHENYL	73%	43 - 103
NITROBENZENE-D5	66%	38 - 112
TERPHENYL-D14	95%	49 - 105

Analyst: [signature] 1/23/97

Reviewer: GE 1/23/97

American Environmental Network, Inc.

KCSlip4 39671

SEA406201

METHOD:	EPA 8270	AEN I.D.:	610585-9
CLIENT I.D.:	SB-9-9	DATE SAMPLED:	10/16/96
CLIENT:	ERM-West, Inc.	DATE RECEIVED:	10/17/96
PROJECT #:	6032.20	DATE EXTRACTED:	10/30/96
PROJECT NAME:	Seattle ANGS	DATE ANALYZED:	10/31/96
SAMPLE MATRIX:	SOIL	DILUTION FACTOR:	1
		UNITS:	mg/kg

RESULTS CORRECTED FOR MOISTURE CONTENT

PARAMETER	RESULTS
Acenaphthene	< 0.43
Acenaphthylene	< 0.43
Aniline	< 0.43
Anthracene	< 0.43
Benzidine	< 0.43 UJ
Benzo(a)anthracene	< 0.43
Benzo(b)fluoranthene	< 0.43
Benzo(k)fluoranthene	< 0.43
Benzo(g,h,i)perylene	< 0.43
Benzo(a)pyrene	< 0.43
Benzoic Acid	< 2.2
Benzyl Alcohol	< 0.43
Bis(2-chloroethoxy)methane	< 0.43
Bis(2-chloroethyl) ether	< 0.43
Bis(2-chloroisopropyl) ether	< 0.43
Bis(2-ethylhexyl)phthalate	3.9
4-Bromophenyl phenyl ether	< 0.43
Butyl benzyl phthalate	< 0.43
4-Chloroaniline	< 0.43
4-Chloro-3-methylphenol	< 0.43
2-Chloronaphthalene	< 0.43
2-Chlorophenol	< 0.43
4-Chlorophenyl phenyl ether	< 0.43
Chrysene	< 0.43
Dibenzofuran	< 0.43
Dibenzo(a,h)anthracene	< 0.43
Di-n-butyl phthalate	< 0.43
1,2-Dichlorobenzene	< 0.43
1,3-Dichlorobenzene	< 0.43
1,4-Dichlorobenzene	< 0.43
3,3'-Dichlorobenzidine	< 2.2
2,4-Dichlorophenol	< 0.43
Diethyl phthalate	< 0.43
2,4-Dimethylphenol	< 0.43
Dimethyl phthalate	< 0.43
4,6-Dinitro-2-methylphenol	< 2.2
2,4,-Dinitrophenol	< 2.2
2,4-Dinitrotoluene	< 0.43
2,6-Dinitrotoluene	< 0.43
Di-n-octyl phthalate	< 0.43

Analyst: 11/23/97

Reviewer: 11/20/97

American Environmental Network, Inc.

KCSlip4 39672

SEA406202

METHOD:	EPA 8270	AEN I.D.:	610585-9
CLIENT I.D.:	SB-9-9	DATE SAMPLED:	10/16/96
CLIENT:	ERM-West, Inc.	DATE RECEIVED:	10/17/96
PROJECT #:	6032.20	DATE EXTRACTED:	10/30/96
PROJECT NAME:	Seattle ANGS	DATE ANALYZED:	10/31/96
SAMPLE MATRIX:	SOIL	DILUTION FACTOR:	1
		UNITS:	mg/kg

RESULTS CORRECTED FOR MOISTURE CONTENT

PARAMETER	RESULTS
Fluoranthene	< 0.43
Fluorene	< 0.43
Hexachlorobenzene	< 0.43
Hexachlorobutadiene	< 0.43
Hexachlorocyclopentadiene	< 0.43
Hexachloroethane	< 0.43
Indeno(1,2,3-cd)pyrene	< 0.43
Isophorone	< 0.43
2-Methylnaphthalene	< 0.43
2-Methylphenol	< 0.43
4-Methylphenol	< 0.43
Naphthalene	< 0.43
2-Nitroaniline	< 0.43
3-Nitroaniline	< 0.43
4-Nitroaniline	< 0.43
Nitrobenzene	< 0.43
2-Nitrophenol	< 0.43
4-Nitrophenol	< 2.2
N-Nitrosodimethylamine	< 0.43
N-Nitroso-di-n-propylamine	< 0.43
N-Nitrosodiphenylamine	< 0.43
Pentachlorophenol	< 2.2
Phenanthrene	< 0.43
Phenol	< 0.43
Pyrene	< 0.43
2,3,4,6-Tetrachlorophenol	< 0.43
1,2,4-Trichlorobenzene	< 0.43
2,4,6-Trichlorophenol	< 0.43
2,4,5-Trichlorophenol	< 2.2

SURROGATES:

	RECOVERY	CONTROL LIMITS (%)
[illegible]	69%	37 - 102
PHENOL-D6	82%	46 - 122
2,4,6-TRIBROMOPHENOL	91%	35 - 149
2-FLUOROBIPHENYL	65%	43 - 103
NITROBENZENE-D5	69%	38 - 112
TERPHENYL-D14	98%	49 - 105

Analyst: 11/28/97

Reviewer: 11/30/97

American Environmental Network, Inc.

KCSlip4 39673

SEA406203

METHOD:	EPA 8270	AEN I.D.:	610585-10
CLIENT I.D.:	SB-10-3	DATE SAMPLED:	10/16/96
CLIENT:	ERM-West, Inc.	DATE RECEIVED:	10/17/96
PROJECT #:	6032.20	DATE EXTRACTED:	10/30/96
PROJECT NAME:	Seattle ANGS	DATE ANALYZED:	10/31/96
SAMPLE MATRIX:	SOIL	DILUTION FACTOR:	1
		UNITS:	mg/kg

RESULTS CORRECTED FOR MOISTURE CONTENT

PARAMETER	RESULTS
Acenaphthene	< 0.38
Acenaphthylene	< 0.38
Aniline	< 0.38
Anthracene	< 0.38
Benzidine	< 0.38 WS
Benzo(a)anthracene	< 0.38
Benzo(b)fluoranthene	< 0.38
Benzo(k)fluoranthene	< 0.38
Benzo(g,h,i)perylene	< 0.38
Benzo(a)pyrene	< 0.38
Benzoic Acid	< 1.9
Benzyl Alcohol	< 0.38
Bis(2-chloroethoxy)methane	< 0.38
Bis(2-chloroethyl) ether	< 0.38
Bis(2-chloroisopropyl) ether	< 0.38
Bis(2-ethylhexyl)phthalate	< 0.38
4-Bromophenyl phenyl ether	< 0.38
Butyl benzyl phthalate	< 0.38
4-Chloroaniline	< 0.38
4-Chloro-3-methylphenol	< 0.38
2-Chloronaphthalene	< 0.38
2-Chlorophenol	< 0.38
4-Chlorophenyl phenyl ether	< 0.38
Chrysene	< 0.38
Dibenzofuran	< 0.38
Dibenzo(a,h)anthracene	< 0.38
Di-n-butyl phthalate	< 0.38
1,2-Dichlorobenzene	< 0.38
1,3-Dichlorobenzene	< 0.38
1,4-Dichlorobenzene	< 0.38
3,3'-Dichlorobenzidine	< 1.9
2,4-Dichlorophenol	< 0.38
Diethyl phthalate	< 0.38
2,4-Dimethylphenol	< 0.38
Dimethyl phthalate	< 0.38
4,6-Dinitro-2-methylphenol	< 1.9
2,4,-Dinitrophenol	< 1.9
2,4-Dinitrotoluene	< 0.38
2,6-Dinitrotoluene	< 0.38
Di-n-octyl phthalate	< 0.38

Analyst: [signature] 11/28/97

Reviewer: CE 11/28/97

American Environmental Network, Inc.

KCSlip4 39674

METHOD:	EPA 8270	AEN I.D.:	610585-10
CLIENT I.D.:	SB-10-3	DATE SAMPLED:	10/16/96
CLIENT:	ERM-West, Inc.	DATE RECEIVED:	10/17/96
PROJECT #:	6032.20	DATE EXTRACTED:	10/30/96
PROJECT NAME:	Seattle ANGS	DATE ANALYZED:	10/31/96
SAMPLE MATRIX:	SOIL	DILUTION FACTOR:	1
		UNITS:	mg/kg

RESULTS CORRECTED FOR MOISTURE CONTENT

PARAMETER	RESULTS
Fluoranthene	< 0.38
Fluorene	< 0.38
Hexachlorobenzene	< 0.38
Hexachlorobutadiene	< 0.38
Hexachlorocyclopentadiene	< 0.38
Hexachloroethane	< 0.38
Indeno(1,2,3-cd)pyrene	< 0.38
Isophorone	< 0.38
2-Methylnaphthalene	< 0.38
2-Methylphenol	< 0.38
4-Methylphenol	< 0.38
Naphthalene	< 0.38
2-Nitroaniline	< 0.38
3-Nitroaniline	< 0.38
4-Nitroaniline	< 0.38
Nitrobenzene	< 0.38
2-Nitrophenol	< 0.38
4-Nitrophenol	< 1.9
N-Nitrosodimethylamine	< 0.38
N-Nitroso-di-n-propylamine	< 0.38
N-Nitrosodiphenylamine	< 0.38
Pentachlorophenol	< 1.9
Phenanthrene	< 0.38
Phenol	< 0.38
Pyrene	< 0.38
2,3,4,6-Tetrachlorophenol	< 0.38
1,2,4-Trichlorobenzene	< 0.38
2,4,6-Trichlorophenol	< 0.38
2,4,5-Trichlorophenol	< 1.9

SURROGATES:

	RECOVERY	CONTROL LIMITS (%)
2-FLUOROPHENOL	52%	37 - 102
PHENOL-D6	77%	46 - 122
2,4,6-TRIBROMOPHENOL	99%	35 - 149
2-FLUOROBIPHENYL	62%	43 - 103
NITROBENZENE-D5	46%	38 - 112
TERPHENYL-D14	97%	49 - 105

Analyst: 10/28/97

Reviewer: CF 1/23/97

American Environmental Network, Inc.

KCSlip4 39675

SEA406205

METHOD:	EPA 8270	AEN I.D.:	610585-13
CLIENT I.D.:	SB-10-9	DATE SAMPLED:	10/16/96
CLIENT:	ERM-West, Inc.	DATE RECEIVED:	10/17/96
PROJECT #:	6032.20	DATE EXTRACTED:	10/30/96
PROJECT NAME:	Seattle ANGS	DATE ANALYZED:	10/31/96
SAMPLE MATRIX:	SOIL	DILUTION FACTOR:	1
		UNITS:	mg/kg

RESULTS CORRECTED FOR MOISTURE CONTENT

PARAMETER	RESULTS
Acenaphthene	< 0.45
Acenaphthylene	< 0.45
Aniline	< 0.45
Anthracene	< 0.45
Benzidine	< 0.45 UJ
Benzo(a)anthracene	< 0.45
Benzo(b)fluoranthene	< 0.45
Benzo(k)fluoranthene	< 0.45
Benzo(g,h,i)perylene	< 0.45
Benzo(a)pyrene	< 0.45
Benzoic Acid	< 2.3
Benzyl Alcohol	< 0.45
Bis(2-chloroethoxy)methane	< 0.45
Bis(2-chloroethyl) ether	< 0.45
Bis(2-chloroisopropyl) ether	< 0.45
Bis(2-ethylhexyl)phthalate	< 0.45
4-Bromophenyl phenyl ether	< 0.45
Butyl benzyl phthalate	< 0.45
4-Chloroaniline	< 0.45
4-Chloro-3-methylphenol	< 0.45
2-Chloronaphthalene	< 0.45
2-Chlorophenol	< 0.45
4-Chlorophenyl phenyl ether	< 0.45
Chrysene	< 0.45
Dibenzofuran	< 0.45
Dibenzo(a,h)anthracene	< 0.45
Di-n-butyl phthalate	< 0.45
1,2-Dichlorobenzene	< 0.45
1,3-Dichlorobenzene	< 0.45
1,4-Dichlorobenzene	< 0.45
3,3'-Dichlorobenzidine	< 2.3
2,4-Dichlorophenol	< 0.45
Diethyl phthalate	< 0.45
2,4-Dimethylphenol	< 0.45
Dimethyl phthalate	< 0.45
4,6-Dinitro-2-methylphenol	< 2.3
2,4,-Dinitrophenol	< 2.3
2,4-Dinitrotoluene	< 0.45
2,6-Dinitrotoluene	< 0.45
Di-n-octyl phthalate	< 0.45

Analyst: 10/23/97

Reviewer: 10/23/97

American Environmental Network, Inc.

KCSlip4 39676

SEA406206

METHOD:	EPA 8270	AEN I.D.:	610585-13
CLIENT I.D.:	SB-10-9	DATE SAMPLED:	10/16/96
CLIENT:	ERM-West, Inc.	DATE RECEIVED:	10/17/96
PROJECT #:	6032.20	DATE EXTRACTED:	10/30/96
PROJECT NAME:	Seattle ANGS	DATE ANALYZED:	10/31/96
SAMPLE MATRIX:	SOIL	DILUTION FACTOR:	1
		UNITS:	mg/kg

RESULTS CORRECTED FOR MOISTURE CONTENT

PARAMETER	RESULTS
Fluoranthene	< 0.45
Fluorene	< 0.45
Hexachlorobenzene	< 0.45
Hexachlorobutadiene	< 0.45
Hexachlorocyclopentadiene	< 0.45
Hexachloroethane	< 0.45
Indeno(1,2,3-cd)pyrene	< 0.45
Isophorone	< 0.45
2-Methylnaphthalene	< 0.45
2-Methylphenol	< 0.45
4-Methylphenol	< 0.45
Naphthalene	< 0.45
2-Nitroaniline	< 0.45
3-Nitroaniline	< 0.45
4-Nitroaniline	< 0.45
Nitrobenzene	< 0.45
2-Nitrophenol	< 0.45
4-Nitrophenol	< 2.3
N-Nitrosodimethylamine	< 0.45
N-Nitroso-di-n-propylamine	< 0.45
N-Nitrosodiphenylamine	< 0.45
Pentachlorophenol	< 2.3
Phenanthrene	< 0.45
Phenol	< 0.45
Pyrene	< 0.45
2,3,4,6-Tetrachlorophenol	< 0.45
1,2,4-Trichlorobenzene	< 0.45
2,4,6-Trichlorophenol	< 0.45
2,4,5-Trichlorophenol	< 2.3

SURROGATES:

	RECOVERY	CONTROL LIMITS (%)
2-FLUOROPHENOL	53%	37 - 102
PHENOL-D6	73%	46 - 122
2,4,6-TRIBROMOPHENOL	87%	35 - 149
2-FLUOROBIPHENYL	34% H	43 - 103
NITROBENZENE-D5	40%	38 - 112
TERPHENYL-D14	94%	49 - 105

H = Out of Limits

Analyst: [signature] 10/31/96

Reviewer: [signature] 11/3/96

American Environmental Network, Inc.

KCSlip4 39677

SEA406207

METHOD:	EPA 8270	AEN I.D.:	610585-15
CLIENT I.D.:	SB-11-3	DATE SAMPLED:	10/16/96
CLIENT:	ERM-West, Inc.	DATE RECEIVED:	10/17/96
PROJECT #:	6032.20	DATE EXTRACTED:	10/30/96
PROJECT NAME:	Seattle ANGS	DATE ANALYZED:	10/31/96
SAMPLE MATRIX:	SOIL	DILUTION FACTOR:	1
		UNITS:	mg/kg

RESULTS CORRECTED FOR MOISTURE CONTENT

PARAMETER	RESULTS
Acenaphthene	< 0.38
Acenaphthylene	< 0.38
Aniline	< 0.38
Anthracene	< 0.38
Benzidine	< 0.38 WJ
Benzo(a)anthracene	< 0.38
Benzo(b)fluoranthene	< 0.38
Benzo(k)fluoranthene	< 0.38
Benzo(g,h,i)perylene	< 0.38
Benzo(a)pyrene	< 0.38
Benzoic Acid	< 2.0
Benzyl Alcohol	< 0.38
Bis(2-chloroethoxy)methane	< 0.38
Bis(2-chloroethyl) ether	< 0.38
Bis(2-chloroisopropyl) ether	< 0.38
Bis(2-ethylhexyl)phthalate	< 0.38
4-Bromophenyl phenyl ether	< 0.38
Butyl benzyl phthalate	< 0.38
4-Chloroaniline	< 0.38
4-Chloro-3-methylphenol	< 0.38
2-Chloronaphthalene	< 0.38
2-Chlorophenol	< 0.38
4-Chlorophenyl phenyl ether	< 0.38
Chrysene	< 0.38
Dibenzofuran	< 0.38
Dibenzo(a,h)anthracene	< 0.38
Di-n-butyl phthalate	< 0.38
1,2-Dichlorobenzene	< 0.38
1,3-Dichlorobenzene	< 0.38
1,4-Dichlorobenzene	< 0.38
3,3'-Dichlorobenzidine	< 2.0
2,4-Dichlorophenol	< 0.38
Diethyl phthalate	< 0.38
2,4-Dimethylphenol	< 0.38
Dimethyl phthalate	< 0.38
4,6-Dinitro-2-methylphenol	< 2.0
2,4,-Dinitrophenol	< 2.0
2,4-Dinitrotoluene	< 0.38
2,6-Dinitrotoluene	< 0.38
Di-n-octyl phthalate	< 0.38

Analyst: ~~[illegible]~~ 11/23/97

Reviewer: CE 11/23/97

American Environmental Network, Inc.

KCSlip4 39678

SEA406208

METHOD:	EPA 8270	AEN I.D.:	610585-15
CLIENT I.D.:	SB-11-3	DATE SAMPLED:	10/16/96
CLIENT:	ERM-West, Inc.	DATE RECEIVED:	10/17/96
PROJECT #:	6032.20	DATE EXTRACTED:	10/30/96
PROJECT NAME:	Seattle ANGS	DATE ANALYZED:	10/31/96
SAMPLE MATRIX:	SOIL	DILUTION FACTOR:	1
		UNITS:	mg/kg

RESULTS CORRECTED FOR MOISTURE CONTENT

PARAMETER	RESULTS
Fluoranthene	< 0.38
Fluorene	< 0.38
Hexachlorobenzene	< 0.38
Hexachlorobutadiene	< 0.38
Hexachlorocyclopentadiene	< 0.38
Hexachloroethane	< 0.38
Indeno(1,2,3-cd)pyrene	< 0.38
Isophorone	< 0.38
2-Methylnaphthalene	< 0.38
2-Methylphenol	< 0.38
4-Methylphenol	< 0.38
Naphthalene	< 0.38
2-Nitroaniline	< 0.38
3-Nitroaniline	< 0.38
4-Nitroaniline	< 0.38
Nitrobenzene	< 0.38
2-Nitrophenol	< 0.38
4-Nitrophenol	< 2.0
N-Nitrosodimethylamine	< 0.38
N-Nitroso-di-n-propylamine	< 0.38
N-Nitrosodiphenylamine	< 0.38
Pentachlorophenol	< 2.0
Phenanthrene	< 0.38
Phenol	< 0.38
Pyrene	< 0.38
2,3,4,6-Tetrachlorophenol	< 0.38
1,2,4-Trichlorobenzene	< 0.38
2,4,6-Trichlorophenol	< 0.38
2,4,5-Trichlorophenol	< 2.0

SURROGATES:

	RECOVERY	CONTROL LIMITS (%)
2-FLUOROPHENOL	52%	37 - 102
PHENOL-D6	77%	46 - 122
2,4,6-TRIBROMOPHENOL	91%	35 - 149
2-FLUOROBIPHENYL	57%	43 - 103
NITROBENZENE-D5	46%	38 - 112
TERPHENYL-D14	94%	49 - 105

Analyst: 10/23/97

Reviewer: 10/23/97

American Environmental Network, Inc.

KCSlip4 39679

SEA406209

METHOD:	EPA 8270	AEN I.D.:	610585-18
CLIENT I.D.:	SS-11-9	DATE SAMPLED:	10/16/96
CLIENT:	ERM-West, Inc.	DATE RECEIVED:	10/17/96
PROJECT #:	6032.20	DATE EXTRACTED:	10/30/96
PROJECT NAME:	Seattle ANGS	DATE ANALYZED:	10/31/96
SAMPLE MATRIX:	SOIL	DILUTION FACTOR:	1
		UNITS:	mg/kg

RESULTS CORRECTED FOR MOISTURE CONTENT

PARAMETER	RESULTS
Acenaphthene	< 0.51
Acenaphthylene	< 0.51
Aniline	< 0.51
Anthracene	< 0.51
Benzidine	< 0.51 UJ
Benzo(a)anthracene	< 0.51
Benzo(b)fluoranthene	< 0.51
Benzo(k)fluoranthene	< 0.51
Benzo(g,h,i)perylene	< 0.51
Benzo(a)pyrene	< 0.51
Benzoic Acid	< 2.6
Benzyl Alcohol	< 0.51
Bis(2-chloroethoxy)methane	< 0.51
Bis(2-chloroethyl) ether	< 0.51
Bis(2-chloroisopropyl) ether	< 0.51
Bis(2-ethylhexyl)phthalate	< 0.51
4-Bromophenyl phenyl ether	< 0.51
Butyl benzyl phthalate	< 0.51
4-Chloroaniline	< 0.51
4-Chloro-3-methylphenol	< 0.51
2-Chloronaphthalene	< 0.51
2-Chlorophenol	< 0.51
4-Chlorophenyl phenyl ether	< 0.51
Chrysene	< 0.51
Dibenzofuran	< 0.51
Dibenzo(a,h)anthracene	< 0.51
Di-n-butyl phthalate	< 0.51
1,2-Dichlorobenzene	< 0.51
1,3-Dichlorobenzene	< 0.51
1,4-Dichlorobenzene	< 0.51
3,3'-Dichlorobenzidine	< 2.6
2,4-Dichlorophenol	< 0.51
Diethyl phthalate	< 0.51
2,4-Dimethylphenol	< 0.51
Dimethyl phthalate	< 0.51
4,6-Dinitro-2-methylphenol	< 2.6
2,4,-Dinitrophenol	< 2.6
2,4-Dinitrotoluene	< 0.51
2,6-Dinitrotoluene	< 0.51
Di-n-octyl phthalate	< 0.51

METHOD:	EPA 8270	**AEN I.D.:**	610585-18
CLIENT I.D.:	SS-11-9	**DATE SAMPLED:**	10/16/96
CLIENT:	ERM-West, Inc.	**DATE RECEIVED:**	10/17/96
PROJECT #:	6032.20	**DATE EXTRACTED:**	10/30/96
PROJECT NAME:	Seattle ANGS	**DATE ANALYZED:**	10/31/96
SAMPLE MATRIX:	SOIL	**DILUTION FACTOR:**	1
		UNITS:	mg/kg

RESULTS CORRECTED FOR MOISTURE CONTENT

PARAMETER	RESULTS
Fluoranthene	< 0.51
Fluorene	< 0.51
Hexachlorobenzene	< 0.51
Hexachlorobutadiene	< 0.51
Hexachlorocyclopentadiene	< 0.51
Hexachloroethane	< 0.51
Indeno(1,2,3-cd)pyrene	< 0.51
Isophorone	< 0.51
2-Methylnaphthalene	< 0.51
2-Methylphenol	< 0.51
4-Methylphenol	< 0.51
Naphthalene	< 0.51
2-Nitroaniline	< 0.51
3-Nitroaniline	< 0.51
4-Nitroaniline	< 0.51
Nitrobenzene	< 0.51
2-Nitrophenol	< 0.51
4-Nitrophenol	< 2.6
N-Nitrosodimethylamine	< 0.51
N-Nitroso-di-n-propylamine	< 0.51
N-Nitrosodiphenylamine	< 0.51
Pentachlorophenol	< 2.6
Phenanthrene	< 0.51
Phenol	< 0.51
Pyrene	< 0.51
2,3,4,6-Tetrachlorophenol	< 0.51
1,2,4-Trichlorobenzene	< 0.51
2,4,6-Trichlorophenol	< 0.51
2,4,5-Trichlorophenol	< 2.6

SURROGATES:

	RECOVERY	CONTROL LIMITS
2-FLUOROPHENOL	44%	25%-121%
PHENOL-D6	64%	24%-113%
2,4,6-TRIBROMOPHENOL	90%	19%-122%
2-FLUOROBIPHENYL	33%	30%-115%
NITROBENZENE-D5	37%	23%-120%
TERPHENYL-D14	90%	18%-137%

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DATA VALIDATION REPORT FOR EXTRACTABLE TOTAL PETROLEUM HYDROCARBON ANALYTICAL RESULTS FOR SAMPLES COLLECTED ON OCTOBER 16, 1996, FROM THE SEATTLE AIR NATIONAL GUARD STATION IN SEATTLE, WASHINGTON

AMERICAN ENVIRONMENTAL NETWORK LABORATORY - DURHAM, OREGON
WORK ORDER NO. 610585

Prepared for
Air National Guard

April 1997

ERM File: 610585 TPHe Seattle

KCSlip4 39683

SEA406213

NARRATIVE

Environmental Resources Management (ERM) collected eight soil samples, one duplicate sample, and one equipment rinsate blank from the Air National Guard Station in Seattle, Washington, on October 16, 1996. The samples were relinquished by ERM to the laboratory courier under documented chain of custody on October 16, 1996, for transport to American Environmental Network (AEN) Laboratory in Durham, Oregon.

The samples included in the validatable data package for this sample delivery group (SDG) were characterized as follows:

ERM Sample ID	Laboratory Sample ID	Level/ Matrix	Date Collected
SB-8-3	610585-1	low/soil	10/16/96
SB-8-9	610585-4	low/soil	10/16/96
SB-9-3	610585-5	low/soil	10/16/96
SB-9-3*	610585-6	low/soil	10/16/96
SB-9-9	610585-9	low/soil	10/16/96
SB-10-3	610585-10	low/soil	10/16/96
SB-10-9	610585-13	low/soil	10/16/96
SB-10-9*	610585-14	low/water	10/16/96
SB-11-3	610585-15	low/soil	10/16/96
SB-11-9	610585-18	low/soil	10/16/96

AEN did not analyze a matrix spike/matrix spike duplicate for total petroleum hydrocarbons (TPH); however, they did analyze two laboratory control sample/laboratory control sample duplicate pairs. Sample SB-9-3* was the duplicate soil sample, and sample SB-10-9* was the equipment rinsate blank.

Extractable TPH data were acquired according to Washington Methods WTPH-HCID and WTPH-D. These methods are based on USEPA SW-846, *Test Methods for Evaluating Sold Waste, Physical/Chemical Methods*, "Modified Method 8015" (November 1986, Third Edition, Volume 1B, Revision 2, September 1994).

Validation of these data was based on the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review* (Office of Solid Waste and Emergency Response, Publication 9240.1-05, PB94-9635-1, EPA-540/R-94/012, US Environmental Protection Agency, Washington, D. C., February 1993). (Organic Functional Guidelines).

The areas reviewed during the data validation procedure are listed below:

I. Sample Preservation and Holding Times

II. Initial Calibration

III. Continuing Calibration

IV. Blanks

V. Surrogate Spikes

VI. Matrix Spike/Matrix Spike Duplicates

VII. Laboratory Control Samples

VIII. Regional Quality Assurance and Quality Control

IX. Target Compound Identification

X. Compound Quantitation and Contract Required Quantitation Limits (CRQLs)

XI. System Performance

XII. Field Duplicates

XIII. Overall Assessment of Data

XIV. Documentation

All laboratory results have been accepted (unqualified), qualified, or rejected.

- Unqualified results are valid for the specified procedures and may be used without reservations.
- Qualified results are usable with the indicated limitation.
- Rejected results are unusable. The analyte may or may not be present. Resampling and reanalysis will be necessary for verification.

Qualified and rejected results are annotated in accordance with the Organic Functional Guidelines using the following codes:

U The analyte was analyzed for but was not detected above the reported value.

J	The reported value is an estimate.
R	The data are unusable. The presence or absence of the analyte cannot be verified from the existing data. Resampling and reanalysis are necessary for verification.
N	There is presumptive evidence to make a tentative identification.
NJ	There is presumptive evidence to make a tentative identification; the reported value is an estimate.
UJ	The analyte was analyzed for but was not detected above the reported value; the reported value is an estimate.

DATA VALIDATION RESULTS

I. SAMPLE PRESERVATION AND HOLDING TIMES

The suggested maximum holding times specified by Washington Method WTPH-D for aqueous samples are 7 days from the date of collection to extract the sample and 30 days from the date of collection to analyze it. The aqueous samples were extracted 8 days after the collection date. The sample extracts were analyzed 9 days after the collection date.

The suggested maximum holding times for soil samples are 14 days from the date of collection to extract the sample and 30 days from the date of collection to analyze it. Extraction of the soil samples and analysis of the resultant sample extracts complied with these specifications.

No data were qualified or rejected based on improper sample preservation or exceedance of specified holding times.

II. INITIAL CALIBRATION

The GC employed for samples and associated quality control samples was calibrated at eight concentration levels with a diesel standard.

The initial calibration is summarized below:

GC Instrument ID	Date	Time
Deemter-R	9/26/96	0855 - 1516

All percent relative standard deviations (%RSD) were less than or equal to 30 percent. No data were qualified or rejected based on this initial calibration.

III. CONTINUING CALIBRATION

The GC was calibrated for each subsequent 24-hour shift in which samples or associated quality control samples in this SDG were analyzed. Each continuing calibration was performed at one concentration level with a diesel standard.

The continuing calibrations are summarized below:

GC Instrument ID	Date	Time
Deemter-R	10/23/96	0838
Deemter-R	10/23/96	1225
Deemter-R	10/25/96	1123
Deemter-R	10/25/96	2317

Percent differences (%D) for the target compound were less than 25 percent. No data were qualified or rejected based on these continuing calibrations.

IV. BLANKS

The following method blanks were associated with the samples in this SDG:

Blank ID	Level/ Matrix	Date Extracted	GC Instrument ID	Date Analyzed	Time
MB 102396	low/soil	10/23/96	Deemter-R	10/23/96	1210
MB 102396	low/soil	10/23/96	Deemter-R	10/23/96	2317
MB 102496	low/water	10/24/96	Deemter-R	10/25/96	1500

The target compound was not reported in these blanks.

The following equipment rinsate blank was associated with this SDG:

Blank ID	Level/ Matrix	Date Extracted	GC Instrument ID	Date Analyzed	Time
SB-10-9*	low/water	10/24/96	Deemter-R	10/25/96	1724

The target compound was not reported in this equipment blank.

No data were qualified or rejected based on the method or equipment blank results.

V. SURROGATE SPIKES

All surrogate percent recoveries (%R) were within the specified quality control limits; therefore, no data were qualified or rejected based on surrogate spike recoveries.

VI. MATRIX SPIKE AND MATRIX SPIKE DUPLICATES

The laboratory did not analyze a matrix spike/matrix spike duplicate sample pair. Accuracy and precision were assessed through the laboratory control sample/laboratory control sample duplicate (LCS/LCSD) %Rs and relative percent differences (RPD).

VII. LABORATORY CONTROL SAMPLES

The following LCS/LCSD pairs were associated with the project samples:

Sample ID	Level/ Matrix	Date Extracted	GC Instrument ID	Date Analyzed	Time
SBS 102396	low/soil	10/23/96	Deemter-R	10/23/96	1311
SBSD 102396	low/soil	10/23/96	Deemter-R	10/23/96	1356
WBS 102496	low/water	10/24/96	Deemter-R	10/25/96	1542
WBSD 102496	low/water	10/24/96	Deemter-R	10/25/96	1633

The LCS/LCSD %Rs and RPDs were within specified quality control limits; therefore, no data were qualified or rejected based on LCS/LCSD %Rs and RPDs.

VIII. REGIONAL QUALITY ASSURANCE AND QUALITY CONTROL

No USEPA regional quality assurance and quality control samples were required for this investigation; these samples are typically required only for USEPA Superfund investigations.

IX. TARGET COMPOUND IDENTIFICATION

The target compound was not detected in the project samples. Therefore, the laboratory's ability to correctly identify the target compound was not evaluated.

X. COMPOUND QUANTITATION AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQLs)

The target compound was not detected in the project samples. The laboratory's practical quantitation limits met the CRQLs listed in the project Quality Assurance Project Plan.

XI. SYSTEM PERFORMANCE

No marked changes were observed in instrument performance during the analysis of the samples in this SDG, as determined by the validation.

XII. FIELD DUPLICATES

The field duplicate sample results in this SDG agreed with the associated primary sample results. Both the primary and field duplicate results were ND. These results indicate minimal heterogeneity in the sample matrix.

XIII. OVERALL ASSESSMENT OF DATA

The Validated Data section of this report provides the TPH analysis data sheets for this SDG.

None of the extractable TPH data in this SDG were qualified or rejected.

XIV. DOCUMENTATION

The data package deliverables and analytical requirements specified in the SW-846 method protocols were met for this data set.

VALIDATED DATA

This section provides the TPH analysis data sheets (2 sheets total).

GAS CHROMATOGRAPHY SUMMARY RESULTS

TEST:	TPH-HCID (WASHINGTON)	AEN I.D.:	610585
CLIENT:	ERM-West, Inc.	DATE SAMPLED:	10/16/96
PROJECT #:	6032.20	DATE RECEIVED:	10/17/96
PROJECT NAME:	Seattle ANGS	DATE EXTRACTED:	10/23/96
SAMPLE MATRIX:	SOIL	DILUTION FACTOR:	1
		UNITS:	mg/kg

RESULTS CORRECTED FOR MOISTURE CONTENT

AEN ID	CLIENT ID	DATE ANALYZED	GASOLINE C7 - C12	DIESEL C12 - C24	> C24	SURROGATE (69% - 138%)
610585-0	Method Blank	10/23/96	Less Than 20 mg/Kg	Less Than 50 mg/Kg	Less Than 100 mg/Kg	106% 102%
610585-1	SB-8-3	10/23/96	Less Than 20 mg/Kg	Less Than 50 mg/Kg	Less Than 100 mg/Kg	96% 91%
610585-4	SB-8-9	10/23/96	Less Than 20 mg/Kg	Less Than 50 mg/Kg	Less Than 100 mg/Kg	108% 103%
610585-5	SB-9-3	10/23/96	Less Than 20 mg/Kg	Less Than 50 mg/Kg	Less Than 100 mg/Kg	107% 101%
610585-6	SB-9-3*	10/23/96	Less Than 20 mg/Kg	Less Than 50 mg/Kg	Less Than 100 mg/Kg	110% 105%
610585-9	SB-9-9	10/23/96	Less Than 20 mg/Kg	Less Than 50 mg/Kg	Less Than 100 mg/Kg	100% 93%
610585-10	SB-10-3	10/23/96	Less Than 20 mg/Kg	Less Than 50 mg/Kg	Less Than 100 mg/Kg	109% 103%
610585-13	SB-10-9	10/23/96	Less Than 20 mg/Kg	Less Than 50 mg/Kg	Less Than 100 mg/Kg	90% 84%
610585-15	SB-11-3	10/23/96	Less Than 20 mg/Kg	Less Than 50 mg/Kg	Less Than 100 mg/Kg	103% 97%
610585-18	SB-11-9	10/23/96	Less Than 20 mg/Kg	Less Than 50 mg/Kg	Less Than 100 mg/Kg	103% 97%

Analyst: PK 10/25/96

Reviewed: [illegible] 10/28/96

American Environmental Network, Inc.

KCSlip4 39692

SEA406222

GAS CHROMATOGRAPHY SUMMARY RESULTS

TEST:	8015 (Modified)	**AEN I.D.:**	610585
CLIENT:	ERM-West, Inc.	**DATE SAMPLED:**	10/16/96
PROJECT #:	6032.20	**DATE RECEIVED:**	10/17/96
PROJECT NAME:	Seattle ANGS	**DATE EXTRACTED:**	10/24/96
SAMPLE MATRIX:	Water	**UNITS:**	mg/L

AEN ID	CLIENT ID	DATE ANALYZED	DF	GASOLINE C7 - C12	DIESEL C12 - C24	SURROGATES (88% - 150%)
610585-0	Method Blank	10/25/96	1	< 1.0	< 2.5	125% 124%
610585-14	SB-10-9*	10/25/96	1	< 1.0	< 2.5	131% 128%

Analyst: JK 10/25/96

Reviewer: JK 10/28/96

American Environmental Network, Inc.

KCSlip4 39693

SEA406223

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DATA VALIDATION REPORT FOR METAL ANALYTICAL RESULTS FOR SAMPLES COLLECTED ON OCTOBER 16, 1996, FROM THE SEATTLE AIR NATIONAL GUARD STATION IN SEATTLE, WASHINGTON

AMERICAN ENVIRONMENTAL NETWORK LABORATORY - DURHAM, OREGON
WORK ORDER NO. 610585

Prepared for
Air National Guard

April 1997

ERM File: 610585 Metals Seattle

NARRATIVE

Environmental Resources Management (ERM) collected eight soil samples, one duplicate sample, and one equipment rinsate blank from the Air National Guard Station in Seattle, Washington, on October 16, 1996. The samples were relinquished by ERM to the laboratory courier under documented chain of custody on October 16, 1996, for transport to American Environmental Network (AEN) Laboratory in Durham, Oregon.

The samples included in the validatable data package for this sample delivery group (SDG) were characterized as follows:

ERM Sample I.D.	Laboratory Sample I.D.	Level/ Matrix	Date Collected
SB-8-3	610585-1	low/soil	10/16/96
SB-8-9	610585-4	low/soil	10/16/96
SB-9-3	610585-5	low/soil	10/16/96
SB-9-3*	610585-6	low/soil	10/16/96
SB-9-9	610585-9	low/soil	10/16/96
SB-10-3	610585-10	low/soil	10/16/96
SB-10-9	610585-13	low/soil	10/16/96
SB-10-9*	610585-14	low/water	10/16/96
SB-11-3	610585-15	low/soil	10/16/96
SB-11-9	610585-18	low/soil	10/16/96

AEN selected samples SB-8-9, SB-10-3, and SB-10-9* for the matrix spike and laboratory duplicate sample analyses. Sample SB-9-3* was the field duplicate sample, and sample SB-10-9* was the equipment rinsate blank.

Metals data were acquired according to the USEPA SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, "Methods 6010/7000 Series" (November 1986, Third Edition, Volume 1B, Revision 2, September 1994).

Validation of these data was based on the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (Office of Solid Waste and Emergency Response, Publication 9240.1-05-01. PB94-963502, EPA-540/R-94/013, US Environmental Protection Agency, Washington, DC, February 1994). (Inorganic Functional Guidelines).

The areas reviewed during the data validation procedure are listed below:

I. Sample Preservation and Holding Times

II. Calibrations

a. Initial Calibration
b. Initial and Continuing Calibration Verifications
c. Contract Required Detection Limit (CRDL) Standard for Mercury and ICP

III. Blanks

IV. ICP Interference Check Samples

V. Laboratory Control Samples (LCS)

VI. Duplicate Sample Analysis

VII. Spike Sample Analysis

VIII. Graphite Furnace Atomic Absorption Quality Control

IX. ICP Serial Dilution

X. Field Duplicates

XI. Overall Assessment of Data

XII. Documentation

All laboratory results have been accepted (unqualified), qualified, or rejected.

- Unqualified results are valid for the specified procedures and may be used without reservations.
- Qualified results are usable with the indicated limitation.
- Rejected results are unusable. The analyte may or may not be present. Resampling and reanalysis will be necessary for verification.

Qualified and rejected results are annotate in accordance with the Inorganic Functional Guidelines using the following codes:

U	The analyte was analyzed for but was not detected above the reported value.
J	The reported value is an estimate.
R	The data are unusable. The presence or absence of the analyte cannot be verified from the existing data. Resampling and reanalysis are necessary for verification.

UJ The analyte was analyzed for but was not detected above the reported value; the reported value is an estimate.

DATA VALIDATION RESULTS

I. SAMPLE PRESERVATION AND HOLDING TIMES

All inductively coupled plasma (ICP) and graphite furnace atomic absorption (GFAA) metals samples were properly preserved (4°C ±2°C) and were digested and analyzed within the 6-month method-specific holding time from the date of collection to the date of analysis. All samples analyzed for mercury were properly preserved (4°C ±2°C) and were digested and analyzed within the method-specified 28-day holding time.

No data were qualified or rejected based on improper sample preservation or exceedance of specified holding times.

II. CALIBRATIONS

a. Initial Calibration

All initial calibrations were acceptably performed as required by SW-846 method protocols for the GFAA, ICP, and mercury analytical sequences. No data were qualified or rejected based on this initial calibration.

b. Initial and Continuing Calibration Verifications

All initial and continuing calibration verifications were acceptably performed as required by SW-846 method protocols for the GFAA, ICP, and mercury analytical sequences.

c. Contract Required Detection Limit (CRDL) Standard for Mercury and ICP

All CRDL standard sample percent recoveries (%R) were between 75 and 125 percent; therefore no data were qualified or rejected based on CRDL %Rs.

III. BLANKS

The following preparation blanks were associated with these samples:

Prep Blank Sample ID	Associated ERM Sample ID
SPB (P) 10/25/96	All soil samples in this SDG
SPB (F) 10/25/96	All soil samples in this SDG
SPB (CV) 11/04/96	All soil samples in this SDG
WPB (P) 10/23/96	All water samples in this SDG
WPB (F) 10/23/96	All water samples in this SDG
WPB (CV) 11/01/96	All water samples in this SDG

The following target analytes were reported in the initial or continuing calibration blanks or preparation blanks associated with the project samples:

Blank ID	Analyte	Concentration
SICB	Selenium	2 B
SCCB	Cadmium	1 B
	Iron	64
	Mercury	0.2 B
	Zinc	2 B
WPB (P) 10/23/96	Chromium	5 B
WCCB	Arsenic	1 B

None of the associated data were qualified based on the blank results.

The following equipment rinsate blank was submitted with the samples in this SDG:

ERM Field Blank Sample ID	Type of Blank
SB-10-9*	Equipment Rinsate Blank

No target analytes were reported in the equipment rinsate blank.

IV. ICP INTERFERENCE CHECK SAMPLES (ICS)

The ICP interference check sample (ICS) %Rs were acceptable (80 to 120 percent). In addition, no non-ICS analytes were present in the ICS solutions at levels (absolute values) greater than twice the instrument detection limit.

The laboratory analyzed the ICS-A solution at a 10-to-1 dilution; this solution should be analyzed undiluted. Because of the improper dilution, the laboratory qualified the antimony, chromium, copper, nickel, silver, and zinc results with an "E," denoting estimated values. Each of these results was qualified as estimated based on the laboratory's inability to correctly apply interelement correction factors for these elements. The results were subsequently qualified as estimated, "J/UJ," during the validation of the data.

V. LABORATORY CONTROL SAMPLES (LCS)

The following LCS were associated with the samples in this SDG:

LCS ID	Associated ERM Sample ID
SLCS (P) 10/25/96	All soil samples in this SDG
SLCS (F) 10/25/96	All soil samples in this SDG
SLCS (CV) 11/04/96	All soil samples in this SDG
WLCS (P) 10/23/96	All water samples in this SDG
WLCS (F) 10/23/96	All water samples in this SDG
WLCS (CV) 11/01/96	All water samples in this SDG

All LCS results were within the established control limits; therefore, no data were qualified or rejected based on the LCS results.

VI. DUPLICATE SAMPLE ANALYSIS

The laboratory performed the laboratory duplicate sample analysis on the following samples:

ERM Sample ID	Laboratory Duplicate Sample ID
SB-8-9	SB-8-9D
SB-10-3	SB-10-3D
SB-10-9*	SB-10-9*D

The laboratory duplicate samples were associated with these samples in the SDG:

Laboratory Duplicate Sample ID	Associated ERM Sample ID
SB-8-9D	All soil samples in this SDG
SB-10-3D	All soil samples in this SDG
SB-10-9*D	All water samples in this SDG

The laboratory duplicate sample relative percent differences (RPD) were within specified quality control limits, with the following exception:

Duplicate Sample ID	Metal	RPD	Limit
SB-10-3D	Copper	42	20

Soil results for copper were previously qualified as estimated, "J," based on the ICS results.

VII. SPIKE SAMPLE ANALYSIS

The laboratory performed the matrix spike (MS) sample analysis on the following samples:

ERM Sample ID	Laboratory Spike Sample ID
SB-8-9	SB-8-9S
SB-10-3	SB-10-3S
SB-10-9*	SB-10-9*S

The MS samples were associated with these samples in the SDG:

Laboratory Spike Sample ID	Associated ERM Sample ID
SB-8-9S	All soil samples in this SDG
SB-10-3S	All soil samples in this SDG
SB-10-9*S	All water samples in this SDG

The MS %Rs were within specified quality control limits, with the following exceptions:

Spike Sample ID	Metal	%R	Limits
SB-8-9S	Antimony	35	75 - 125
	Selenium	143	75 - 125
	Thallium	54	75 - 125
SB-10-3S	Antimony	33	75 - 125
	Thallium	58	75 - 125

The soil results for antimony were previously qualified as estimated, "J," based on the ICS results. Soil results for thallium were qualified as estimated, "J," based on the MS %Rs. The results for selenium were not qualified because a positive bias would be expected as a result of the high %R, whereas selenium was not detected in the project samples.

VIII. GRAPHITE FURNACE ATOMIC ABSORPTION QUALITY CONTROL

All relative standard deviations (RSD) between the GFAA duplicate injections were acceptable.

All post-digestion MS %Rs were acceptable.

The method of standard additions (MSA) was required for the analysis of the following samples:

ERM Sample ID	Analyte
SB-10-9	Arsenic
SB-11-9	Arsenic

The MSA correlation coefficients were 0.995 or greater.

No data were qualified or rejected based on the above results.

IX. ICP SERIAL DILUTION

The laboratory performed the ICP serial dilution analysis on the following samples:

ERM Sample ID	Laboratory Serial Dilution Sample ID
SB-8-3	SB-8-3L
SB-10-9*	SB-10-9*L

The ICP serial dilution samples were associated with these samples in this SDG:

Laboratory Serial Dilution Sample ID	Associated ERM Sample IDs
SB-8-3L	All soil samples in the SDG
SB-10-9*L	All water samples in the SDG

The ICP serial dilution percent differences (%D) were within specified quality control limits, with the following exceptions:

Laboratory Serial Dilution Sample ID	Metal	%D
SB-8-3L	Chromium	59
	Copper	54
	Lead	50
	Nickel	57
	Zinc	58

The soil results for chromium, copper, nickel, and zinc were previously qualified as estimated, "J," based on the ICS results. The soil results for lead were qualified as estimated, "J," based on the ICP serial dilution %Ds.

X. FIELD DUPLICATES

The field duplicate sample was identified as follows:

ERM Sample ID	ERM Duplicate Sample ID
SB-9-3	SB-9-3*

The field duplicate RPDs were within specified quality control limits (<30 percent), with four exceptions: the RPD for arsenic was 48, the RPD for lead was 105, the RPD for nickel was 33, and the RPD for zinc was 133. The soil arsenic results were qualified as estimated, "J," based on the elevated RPD. Nickel and zinc soil results were previously qualified based on the ICS results; lead soil results were previously qualified based on the ICP serial dilution results.

XI. OVERALL ASSESSMENT OF DATA

The Validated Data section of this report provides the metal analysis data sheets for this SDG; these sheets include all data validation qualifiers applied by ERM.

Fifty-four detect data points for six target compounds were qualified as estimated, "J," and thirty-three non-detect data points for seven target compounds were qualified as estimated detection limit, "UJ." No data were rejected.

XII. DOCUMENTATION

The data package deliverables and analytical requirements specified in the SW-846 method protocols were met for this data set.

VALIDATED DATA

This section provides the metal analysis data sheets with the data validation qualifiers applied by ERM (10 sheets total).

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1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.
SB-8-3

Lab Name: AEN Contract:

Lab Code: Case No.: SAS No.: SDG No.:

Matrix (soil/water): Soil Lab Sample ID: 610585-1

Level (low/med): Low Date Received: 10/17/96

% Solids: 72

Concentration Units (ug/L or mg/kg dry weight): mg/kg

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum					
7440-36-0	Antimony	7	U	NE	P	UJ
7440-38-2	Arsenic	11			F	J
7440-39-3	Barium					
7440-41-7	Beryllium	0.7	U		P	
7440-43-9	Cadmium	0.7	U		P	
7440-70-2	Calcium					
7440-47-3	Chromium	14		E	P	UJ
7440-48-4	Cobalt					
7440-50-8	Copper	31		E	P	J
7439-89-6	Iron					
7439-92-1	Lead	64			P	J
7439-95-4	Magnesium					
7439-96-5	Manganese					
7439-97-6	Mercury	0.3	U		CV	
7440-02-0	Nickel	13		E	P	J
7440-09-7	Potassium					
7782-49-2	Selenium	0.7	U	N	F	UJ (rej)
7440-22-4	Silver	1	U	E	P	J UJ
7440-23-5	Sodium					
7440-28-0	Thallium	0.7	U	N	F	UJ
7440-62-2	Vanadium					
7440-66-6	Zinc	89		E	P	J

Color Before: Dark brown Clarity Before: Texture: medium

Color After: Brown Clarity After: Artifacts: none

Comments:

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1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.
SB-8-9

Lab Name: AEN Contract:

Lab Code: Case No.: SAS No.: SDG No.:

Matrix (soil/water): Soil Lab Sample ID: 610585-4

Level (low/med): Low Date Received: 10/17/96

% Solids: 69

Concentration Units (ug/L or mg/kg dry weight): mg/kg

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum					
7440-36-0	Antimony	7	U	NE	P	UJ
7440-38-2	Arsenic	4.5			F	J
7440-39-3	Barium					
7440-41-7	Beryllium	0.7	U		P	
7440-43-9	Cadmium	0.7	U		P	
7440-70-2	Calcium					
7440-47-3	Chromium	16		E	P	J
7440-48-4	Cobalt					
7440-50-8	Copper	26		E	P	J
7439-89-6	Iron					
7439-92-1	Lead	17			P	J
7439-95-4	Magnesium					
7439-96-5	Manganese					
7439-97-6	Mercury	0.3	U		CV	
7440-02-0	Nickel	12		E	P	J
7440-09-7	Potassium					
7782-49-2	Selenium	0.7	U	N	F	UJ (ALL) UJ
7440-22-4	Silver	1	U	E	P	J
7440-23-5	Sodium					
7440-28-0	Thallium	0.7	U	N	F	UJ
7440-62-2	Vanadium					
7440-66-6	Zinc	38		E	P	J

Color Before: Chocolate brwn Clarity Before: Texture: medium

Color After: Tan Clarity After: Artifacts: none

Comments:

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1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.
SB-9-3

Lab Name: AEN Contract:

Lab Code: Case No.: SAS No.: SDG No.:

Matrix (soil/water): Soil Lab Sample ID: 610585-5

Level (low/med): Low Date Received: 10/17/96

% Solids: 67

Concentration Units (ug/L or mg/kg dry weight): mg/kg

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum					
7440-36-0	Antimony	7	U	NE	P	UJ
7440-38-2	Arsenic	12.2			F	J
7440-39-3	Barium					
7440-41-7	Beryllium	0.7	U		P	
7440-43-9	Cadmium	0.7	U		P	
7440-70-2	Calcium					
7440-47-3	Chromium	13		E	P	J
7440-48-4	Cobalt					
7440-50-8	Copper	21		E	P	J
7439-89-6	Iron					
7439-92-1	Lead	76			P	J
7439-95-4	Magnesium					
7439-96-5	Manganese					
7439-97-6	Mercury	0.3	U		CV	
7440-02-0	Nickel	10		E	P	J
7440-09-7	Potassium					
7782-49-2	Selenium	0.7	U	N	F	
7440-22-4	Silver	1	U	E	P	J UJ
7440-23-5	Sodium					
7440-28-0	Thallium	0.7	U	N	F	UJ
7440-62-2	Vanadium					
7440-66-6	Zinc	42		E	P	J

Color Before: choc brown Clarity Before: Texture: medium

Color After: brown Clarity After: Artifacts: none

Comments:

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1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.
SB-9-3*

Lab Name: AEN Contract:

Lab Code: Case No.: SAS No.: SDG No.:

Matrix (soil/water): Soil Lab Sample ID: 610585-6

Level (low/med): Low Date Received: 10/17/96

% Solids: 69

Concentration Units (ug/L or mg/kg dry weight): mg/kg

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum					
7440-36-0	Antimony	7	U	NE	P	UJ
7440-38-2	Arsenic	20.0			F	J
7440-39-3	Barium					
7440-41-7	Beryllium	0.7	U		P	
7440-43-9	Cadmium	0.7	U		P	
7440-70-2	Calcium					
7440-47-3	Chromium	16		E	P	J
7440-48-4	Cobalt					
7440-50-8	Copper	28		E	P	J
7439-89-6	Iron					
7439-92-1	Lead	245			P	J
7439-95-4	Magnesium					
7439-96-5	Manganese					
7439-97-6	Mercury	0.3	U		CV	
7440-02-0	Nickel	14		E	P	J
7440-09-7	Potassium					
7782-49-2	Selenium	0.7	U	N	F	
7440-22-4	Silver	1	U	E	P	UJ
7440-23-5	Sodium					
7440-28-0	Thallium	0.7	U	N	F	UJ
7440-62-2	Vanadium					
7440-66-6	Zinc	209		E	P	J

Color Before: dark brown Clarity Before: Texture: medium

Color After: brown Clarity After: Artifacts: none

Comments:

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1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.
SB-9-9

Lab Name: AEN Contract:
Lab Code: Case No.: SAS No.: SDG No.:
Matrix (soil/water): Soil Lab Sample ID: 610585-9
Level (low/med): Low Date Received: 10/17/96
% Solids: 76

Concentration Units (ug/L or mg/kg dry weight): mg/kg

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum					
7440-36-0	Antimony	6	U	NE	P	UJ
7440-38-2	Arsenic	5.3			F	J
7440-39-3	Barium					
7440-41-7	Beryllium	0.7	U		P	
7440-43-9	Cadmium	0.7	U		P	
7440-70-2	Calcium					
7440-47-3	Chromium	16		E	P	J
7440-48-4	Cobalt					
7440-50-8	Copper	18		E	P	J
7439-89-6	Iron					
7439-92-1	Lead	13			P	J
7439-95-4	Magnesium					
7439-96-5	Manganese					
7439-97-6	Mercury	0.3	U		CV	
7440-02-0	Nickel	16		E	P	J
7440-09-7	Potassium					
7782-49-2	Selenium	0.7	U	N	F	
7440-22-4	Silver	1	U	E	P	UJ
7440-23-5	Sodium					
7440-28-0	Thallium	0.7	U	N	F	UJ
7440-62-2	Vanadium					
7440-66-6	Zinc	49		E	P	J

Color Before: dark brown Clarity Before: Texture: medium
Color After: tan Clarity After: Artifacts: none
Comments:

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1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.
SB-10-3

Lab Name: AEN Contract:
Lab Code: Case No.: SAS No.: SDG No.:
Matrix (soil/water): Soil Lab Sample ID: 610585-10
Level (low/med): Low Date Received: 10/17/96
% Solids: 88

Concentration Units (ug/L or mg/kg dry weight): mg/kg

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum					
7440-36-0	Antimony	6	U	NE	P	UJ
7440-38-2	Arsenic	4.3			F	J
7440-39-3	Barium					
7440-41-7	Beryllium	0.6	U		P	
7440-43-9	Cadmium	0.6	U		P	
7440-70-2	Calcium					
7440-47-3	Chromium	10		E	P	J
7440-48-4	Cobalt					
7440-50-8	Copper	11		E	P	J
7439-89-6	Iron					
7439-92-1	Lead	11			P	J
7439-95-4	Magnesium					
7439-96-5	Manganese					
7439-97-6	Mercury	0.2	U		CV	
7440-02-0	Nickel	7		E	P	J
7440-09-7	Potassium					
7782-49-2	Selenium	0.6	U		F	
7440-22-4	Silver	1	U	E	P	UJ
7440-23-5	Sodium					
7440-28-0	Thallium	0.6	U	N	F	NJ
7440-62-2	Vanadium					
7440-66-6	Zinc	19		E	P	J

Color Before: dark brown Clarity Before: Texture: medium
Color After: tan Clarity After: Artifacts: none
Comments:

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1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.
SB-10-9

Lab Name: AEN Contract:
Lab Code: Case No.: SAS No.: SDG No.:
Matrix (soil/water): Soil Lab Sample ID: 610585-13
Level (low/med): Low Date Received: 10/17/96
% Solids: 72

Concentration Units (ug/L or mg/kg dry weight): mg/kg

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum					
7440-36-0	Antimony	7	U	NE	P	UJ
7440-38-2	Arsenic	4.6		S	F	J
7440-39-3	Barium					
7440-41-7	Beryllium	0.7	U		P	
7440-43-9	Cadmium	0.7	U		P	
7440-70-2	Calcium					
7440-47-3	Chromium	11		E	P	J
7440-48-4	Cobalt					
7440-50-8	Copper	15		E	P	J
7439-89-6	Iron					
7439-92-1	Lead	18			P	J
7439-95-4	Magnesium					
7439-96-5	Manganese					
7439-97-6	Mercury	0.3	U		CV	
7440-02-0	Nickel	7		E	P	J
7440-09-7	Potassium					
7782-49-2	Selenium	0.7	U		F	
7440-22-4	Silver	1	U	E	P	UJ
7440-23-5	Sodium					
7440-28-0	Thallium	0.7	U	N	F	UJ
7440-62-2	Vanadium					
7440-66-6	Zinc	22		E	P	J

Color Before: dark brown Clarity Before: Texture: medium
Color After: tan Clarity After: Artifacts: none
Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.
SB-11-3

Lab Name: AEN Contract:

Lab Code: Case No.: SAS No.: SDG No.:

Matrix (soil/water): Soil Lab Sample ID: 610585-15

Level (low/med): Low Date Received: 10/17/96

% Solids: 81

Concentration Units (ug/L or mg/kg dry weight): mg/kg

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum					
7440-36-0	Antimony	6	U	NE	P	UJ
7440-38-2	Arsenic	4.0			F	J
7440-39-3	Barium					
7440-41-7	Beryllium	0.6	U		P	
7440-43-9	Cadmium	0.6	U		P	
7440-70-2	Calcium					
7440-47-3	Chromium	11		E	P	J
7440-48-4	Cobalt					
7440-50-8	Copper	18		E	P	J
7439-89-6	Iron					
7439-92-1	Lead	15			P	J
7439-95-4	Magnesium					
7439-96-5	Manganese					
7439-97-6	Mercury	0.2	U		CV	
7440-02-0	Nickel	7		E	P	~~UJ~~ J
7440-09-7	Potassium					
7782-49-2	Selenium	0.6	U		F	
7440-22-4	Silver	1	U	E	P	UJ
7440-23-5	Sodium					
7440-28-0	Thallium	0.6	U	N	F	UJ
7440-62-2	Vanadium					
7440-66-6	Zinc	28		E	P	J

Color Before: choc brown Clarity Before: Texture: medium

Color After: tan Clarity After: Artifacts: none

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.
SB-11-9

Lab Name: AEN Contract:
Lab Code: Case No.: SAS No.: SDG No.:
Matrix (soil/water): Soil Lab Sample ID: 610585-18
Level (low/med): Low Date Received: 10/17/96
% Solids: 65

Concentration Units (ug/L or mg/kg dry weight): mg/kg

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum					
7440-36-0	Antimony	8	U	NE	P	UJ
7440-38-2	Arsenic	6.9		S	F	J
7440-39-3	Barium					
7440-41-7	Beryllium	0.8	U		P	
7440-43-9	Cadmium	0.8	U		P	
7440-70-2	Calcium					
7440-47-3	Chromium	18		E	P	J
7440-48-4	Cobalt					
7440-50-8	Copper	22		E	P	J
7439-89-6	Iron					
7439-92-1	Lead	20			P	J
7439-95-4	Magnesium					
7439-96-5	Manganese					
7439-97-6	Mercury	0.3	U		CV	
7440-02-0	Nickel	20		E	P	J
7440-09-7	Potassium					
7782-49-2	Selenium	0.8	U		F	
7440-22-4	Silver	2	U	E	P	UJ
7440-23-5	Sodium					
7440-28-0	Thallium	0.8	U	N	F	UJ
7440-62-2	Vanadium					
7440-66-6	Zinc	43		E	P	J

Color Before: dark brown Clarity Before: Texture: medium
Color After: tan Clarity After: Artifacts: none
Comments:

METALS RESULTS

CLIENT:	ERM-West, Inc.	**AEN I.D.:**	610585
PROJECT #:	6032.20	**DATE SAMPLED:**	10/16/96
PROJECT NAME:	Seattle ANGS	**DATE RECEIVED:**	10/17/96
SAMPLE MATRIX:	WATER	**DATE DIGESTED:**	10/23;11/01/96
		DATE ANALYZED:	10/25,29-31;11/04/96
		UNITS:	mg/L

	AEN I.D.:	610585-0A	610585-14
	Client I.D.:	Method Blank	SB-10-9*

PARAMETER	METHOD			
ANTIMONY	6010	< 0.05	< 0.05	UJ
ARSENIC	7060	< 0.005	< 0.005	
BERYLLIUM	6010	< 0.005	< 0.005	
CADMIUM	6010	< 0.005	< 0.005	
CHROMIUM	6010	< 0.01	< 0.01	UJ
COPPER	6010	< 0.01	< 0.01	UJ
LEAD	7421	< 0.002	< 0.002	
MERCURY	7470	< 0.0002	< 0.0002	
NICKEL	6010	< 0.02	< 0.02	UJ
SELENIUM	7740	< 0.005	< 0.005	
SILVER	6010	< 0.01	< 0.01	UJ
THALLIUM	7841	< 0.005	< 0.005	
ZINC	6010	< 0.01	< 0.01	UJ

Analyst: KFL 11/14/96

Reviewer: JC 11/14/96

KCSlip4 39715

SEA406245

Date Validation
for # 97.01181

DATA VALIDATION REPORT FOR VOLATILE ORGANIC COMPOUND ANALYTICAL RESULTS FOR SAMPLES COLLECTED ON APRIL 11, 1997, FROM THE SEATTLE AIR NATIONAL GUARD STATION IN SEATTLE, WASHINGTON

AMERICAN ENVIRONMENTAL NETWORK LABORATORY - DURHAM, OREGON
WORK ORDER NO. 97.01181

Prepared for the
Air National Guard

December 1997

ERM File: 1181VOA.doc

NARRATIVE

Environmental Resources Management (ERM) collected four water samples and one duplicate sample from the Air National Guard Station in Seattle, Washington, on April 11, 1997. The samples were relinquished by ERM to the laboratory courier under documented chain of custody on April 11, 1997, for transport to American Environmental Network Laboratory (AEN) in Durham, Oregon.

The samples included in the validatable data package for this sample delivery group (SDG) were characterized as follows:

ERM Sample ID	Laboratory Sample ID	Level/ Matrix	Date Collected
BS-004PZ-97-2	79288	low/water	4/11/97
MW-5-97-2	79291	low/water	4/11/97
MW-5-97-2*	79292	low/water	4/11/97
MW-3-97-2	79293	low/water	4/11/97
MW-4-97-2	79294	low/water	4/11/97

AEN selected sample BS-004PZ-97-2 for the matrix spike/matrix spike duplicate sample pair. Sample MW-5-97-2* was the duplicate sample.

Purgeable volatile organic compound data were acquired according to the USEPA SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, "Method 8260" (November 1986, Third Edition, Volume 1B, Revision 2, September 1994).

Validation of these data was based on the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review* (Office of Solid Waste and Emergency Response, Publication 9240.1-05, PB94-9635-1, EPA-540/R-94/012, US Environmental Protection Agency, Washington, D. C., February 1993). (Organic Functional Guidelines).

The areas reviewed during the data validation procedure are listed below:

I. Sample Preservation and Holding Times

II. GC/MS Instrument Performance Check

III. Initial Calibration

IV. Continuing Calibration

V. Blanks

VI. Surrogate Spikes

VII. Matrix Spike/Matrix Spike Duplicates

VIII. Laboratory Control Samples

IX. Regional Quality Assurance and Quality Control

X. Internal Standards

XI. Target Compound Identification

XII. Compound Quantitation and Contract Required Quantitation Limits (CRQLs)

XIII. Tentatively Identified Compounds

XIV. System Performance

XV. Field Duplicates

XVI. Overall Assessment of Data

XVII. Documentation

All laboratory results have been accepted (unqualified), qualified, or rejected.

- Unqualified results are valid for the specified procedures and may be used without reservations.
- Qualified results are usable with the indicated limitation.
- Rejected results are unusable. The analyte may or may not be present. Resampling and reanalysis will be necessary for verification.

Qualified and rejected results are annotated in accordance with the Organic Functional Guidelines using the following codes:

U	The analyte was analyzed for but was not detected above the reported value.
J	The reported value is an estimate.
R	The data are unusable. The presence or absence of the analyte cannot be verified from the existing data. Resampling and reanalysis are necessary for verification.
N	There is presumptive evidence to make a tentative identification.
NJ	There is presumptive evidence to make a tentative identification; the reported value is an estimate.

UJ The analyte was analyzed for but was not detected above the reported value; the reported value is an estimate.

DATA VALIDATION RESULTS

I. SAMPLE PRESERVATION AND HOLDING TIMES

AEN provided ERM with volatile organic compound sample vials with hydrochloric acid preservative pre-added for water samples. The water samples were analyzed within the 14-day holding time from date of collection, as specified by Method 8260.

No data were qualified or rejected based on improper sample preservation or exceedance of the specified holding time.

II. GC/MS INSTRUMENT PERFORMANCE CHECK

Compliance with the bromofluorobenzene (BFB) instrument tuning criteria was demonstrated for each GC/MS used at the beginning of each 12-hour shift during which standards, samples, or associated quality control samples were analyzed.

All purgeable volatile organic compound analytical work was performed on one GC/MS instrument.

BFB ion abundance criteria were met as follows:

GC/MS Instrument ID	Date	Time
5971 VOA	3/19/97 4/17/97	0959 1143

No data were qualified or rejected based on instrument tuning.

III. INITIAL CALIBRATION

The GC/MS employed for samples and associated quality control samples was calibrated at five concentration levels. Each calibration standard contained all target compounds, surrogates, and internal standards.

The initial calibration is summarized below:

GC/MS Instrument ID	Date	Time
5971 VOA	3/19/97	1258 - 2106

Method 8260 does not specify minimum relative response factors (RRF) for each target compound; a minimum RRF of 0.05 was used to evaluate the sensitivity and response of the instrument to each target compound. All RRFs for target compounds and surrogates were greater than or equal to 0.05, with the following exceptions:

Compound	Average RRF
Isobutyl alcohol	0.02
1,4-Dioxane	0.01

These two compounds were not detected in the samples associated with this calibration. Nondetects for these compounds were qualified as estimated detection limit, "UJ."

All percent relative standard deviations (%RSD) were less than or equal to 30 percent. No data were qualified or rejected based on %RSDs for this initial calibration.

IV. CONTINUING CALIBRATION

The GC/MS was calibrated for each subsequent 12-hour shift in which samples or associated quality control samples in this SDG were analyzed. The continuing calibration was performed at one concentration level with a standard containing all target compounds, all surrogates, and all internal standards.

The continuing calibration is summarized below:

GC/MS Instrument ID	Date	Time
5971 VOA	4/17/97	1203

All RRFs for target compounds and surrogates were greater than or equal to 0.05, with the following exceptions:

Calibration Date	Compound	RRF
4/17/97	Isobutyl alcohol	0.02
	1,4-Dioxane	0.01
	2-Chloroethylvinyl ether	0.00

Percent differences (%D) for all target compounds were 25 percent or less, with the following exceptions:

Calibration Date	Compound	% D
4/17/97	Acrolein	35.4
	Iodomethane	39.2
	Acetonitrile	66
	trans-1,2-Dichloroethene	25.6
	2-Chloroethylvinyl ether	>100

None of the compounds in the above two tables were detected in the samples associated with this calibration. Nondetects for acetonitrile, acrolein, iodomethane, and trans-1,2- dichloroethene in the associated samples were qualified as estimated detection limit, "UJ." The results for 2-chloroethylvinyl ether were rejected, "R," based on high %D observed in the continuing calibration.

V. BLANKS

The following method blank was associated with the samples in this SDG:

Blank ID	Level/ Matrix	GC/MS Instrument ID	Prep Date	Analysis Date	Time
WMB 4/17/97	low/water	5971 VOA	NA	4/17/97	1242

The following target compounds were reported in this blank:

Compound	Concentration (µg/l)
Acetone	3.8 J
Methylene chloride	1.9 J
Naphthalene	0.54 J

The trip and field blanks associated with the validated samples were not included in the validatable data package. However, the results from these blanks

were reviewed and have been used to qualify associated data in this SDG. An equipment rinsate blank was not submitted with this SDG.

The following trip blank was associated with the samples in this SDG:

Blank ID	Level/ Matrix	GC/MS Instrument ID	Prep Date	Analysis Date	Time
TB 041197-2	low/water	NA	NA	4/17/97	NA

NA - not available

No target compounds were reported in this trip blank sample.

The following field blank was associated with the samples in this SDG:

Blank ID	Level/ Matrix	GC/MS Instrument ID	Prep Date	Analysis Date	Time
BS-006PZ-97-2*	low/water	NA	NA	4/17/97	NA

NA - not available

The following target compounds were reported in this blank:

Compound	Concentration (µg/l)
Chloroform	76
Bromodichloromethane	70

Application of the USEPA 10X rule for the common laboratory contaminants resulted in the following target compounds being qualified as non-detect ("U") at the reported concentration:

ERM Sample ID	Compound	Concentration µg/l
BS-004PZ-97-2	Acetone	2.6 JB
	Methylene chloride	8.2 JB
MW-5-97-2	Acetone	2.8 JB
	Methylene chloride	5.9 JB
MW-5-97-2*	Acetone	3.1 JB
	Methylene chloride	4.1 JB
MW-3-97-2	Acetone	3.2 JB
	Methylene chloride	8.2 JB
MW-4-97-2	Acetone	2.4 JB
	Methylene chloride	4.6 JB

Application of the USEPA 5X rule for target compounds other than the common laboratory contaminants resulted in the following target compounds being qualified as non-detect ("U") at the reported concentration:

ERM Sample ID	Compound	Concentration µg/l
BS-004PZ-97-2	Naphthalene	1.6 JB
	Chloroform	0.81 J
	Bromodichloromethane	0.76 J
MW-5-97-2	Naphthalene	1.5 JB
	Chloroform	1.3
	Bromodichloromethane	1.2
MW-5-97-2*	Naphthalene	0.89 JB
	Chloroform	0.59 J
	Bromodichloromethane	0.55 J
MW-3-97-2	Naphthalene	1.4 JB
	Chloroform	0.91 J
	Bromodichloromethane	0.86 J
MW-4-97-2	Naphthalene	1.1 JB
	Chloroform	1.4
	Bromodichloromethane	1.4

VI. SURROGATE SPIKES

All surrogate percent recoveries (%R) were within the specified quality control limits. No data were qualified or rejected based on surrogate spike recoveries.

VII. MATRIX SPIKE AND MATRIX SPIKE DUPLICATES

The following matrix spike/matrix spike duplicate (MS/MSD) sample pair was associated with this SDG:

ERM Sample ID	Level/ Matrix	GC/MS Instrument ID	Analysis Date	Analysis Time
BS-004PZ-97-2MS	low/water	5971 VOA	4/17/97	1557
BS-004PZ-97-2MSD	low/water	5971 VOA	4/17/97	1636

The MS/MSD %Rs and relative percent differences (RPD) were within specified quality control limits; therefore, no data were qualified or rejected based on MS/MSD %Rs or RPDs.

VIII. LABORATORY CONTROL SAMPLES

Laboratory control samples were not reported for the volatile organics analyses performed on the samples in this SDG. Accuracy and precision were assessed through the MS/MSD %Rs and RPDs.

IX. REGIONAL QUALITY ASSURANCE AND QUALITY CONTROL

No USEPA regional quality assurance and quality control samples were required for this investigation; these samples are typically required only for USEPA Superfund investigations.

X. INTERNAL STANDARDS

All internal standard area counts and retention times were within 50 to 200 percent and ±30 seconds, respectively, of those in the associated initial calibration standard midpoint. No data were qualified or rejected based on internal standard response.

XI. TARGET COMPOUND IDENTIFICATION

All target compound identifications were acceptable with regard to the supporting analytical data.

XII. COMPOUND QUANTITATION AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQLs)

All target compound quantitations were acceptable with regard to the supporting analytical data. The laboratory's practical quantitation limits met the CRQLs listed in the project Quality Assurance Project Plan.

XIII. TENTATIVELY IDENTIFIED COMPOUNDS (TICs)

No TICs were reported in this SDG.

XIV. SYSTEM PERFORMANCE

No marked changes were observed in instrument performance during the analysis of the samples in this SDG, as determined by the validation.

XV. FIELD DUPLICATES

The field duplicate sample results in this SDG agreed with the associated primary sample results. An RPD of 13 percent was calculated for the only non-

qualified detection. These results indicate minimal heterogeneity in the sample matrix.

XVI. OVERALL ASSESSMENT OF DATA

The Validated Data section of this report provides the volatile organic compound analysis data sheets for this SDG which include all data validation qualifiers applied by ERM.

Thirty non-detect data points for six target compounds were qualified as estimated detection limit, "UJ." Twenty-five detections for five target compounds were qualified as not detected, "U." Five non-detect data points for one target compound were qualified as rejected, "R."

XVII. DOCUMENTATION

The data package deliverables and analytical requirements specified in the SW-846 method protocols were met for this data set.

VALIDATED DATA

This section provides the volatile organic compound analysis data sheets with the data validation qualifiers applied by ERM (10 sheets total).

EST:	EPA 8260	AEN I.D.:	97.01181-79288
LIENT I.D.:	BS-004PZ-97-2	DATE SAMPLED:	04/11/97
LIENT:	ERM-West, Inc.	DATE RECEIVED:	04/12/97
ROJECT #:	6032.20	DATE ANALYZED:	04/17/97
ROJECT NAME:	Seattle ANGS Qtly	DILUTION FACTOR:	1
AMPLE MATRIX:	WATER	UNITS:	ug/L

ARAMETER	RESULTS		
CETONE	2.6	J,B	U
CETONITRILE	50	U	UJ
CROLEIN	50	U	UJ
CRYLONITRILE	50	U	
LLYL CHLORIDE	50	U	
ENZENE	1.0	U	
ROMOBENZENE	1.0	U	
ROMOCHLOROMETHANE	1.0	U	
ROMODICHLOROMETHANE	0.76	J	U
ROMOFORM	1.0	U	
ROMOMETHANE	2.0	U	
-BUTANONE (MEK)	20	U	
BUTYLBENZENE	1.0	U	
c-BUTYLBENZENE	1.0	U	
rt-BUTYLBENZENE	1.0	U	
ARBON DISULFIDE	1.0	U	
ARBON TETRACHLORIDE	1.0	U	
HLOROBENZENE	1.0	U	
HLOROETHANE	1.0	U	
-CHLOROETHYL VINYL ETHER	10	U	R
HLOROFORM	0.81	J	U
HLOROMETHANE	1.0	U	
-CHLOROTOLUENE	1.0	U	
-CHLOROTOLUENE	1.0	U	
YCLOHEXANE	1.0	U	
IBROMOCHLOROMETHANE	1.0	U	
,2-DIBROMO-3-CHLOROPROPANE	1.0	U	
,2-DIBROMOETHANE (EDB)	1.0	U	
IBROMOMETHANE	1.0	U	
-1,4-DICHLORO-2-BUTENE	1.0	U	
,2-DICHLOROBENZENE	1.0	U	
,3-DICHLOROBENZENE	1.0	U	
,4-DICHLOROBENZENE	1.0	U	
ICHLORODIFLUOROMETHANE	1.0	U	
,1-DICHLOROETHANE	1.0	U	
,2-DICHLOROETHANE (EDC)	1.0	U	
,1-DICHLOROETHENE	1.0	U	
s-1,2-DICHLOROETHENE	1.0	U	
ans-1,2-DICHLOROETHENE	1.0	U	UJ
,2-DICHLOROPROPANE	1.0	U	
,3-DICHLOROPROPANE	1.0	U	
,2-DICHLOROPROPANE	1.0	U	
,1-DICHLOROPROPENE	1.0	U	

		AEN I.D.:	97.01181-79288
TEST:	EPA 8260	DATE SAMPLED:	04/11/97
CLIENT I.D.:	BS-004PZ-97-2	DATE RECEIVED:	04/12/97
CLIENT:	ERM-West, Inc.	DATE ANALYZED:	04/17/97
PROJECT #:	6032.20	DILUTION FACTOR:	1
PROJECT NAME:	Seattle ANGS Qtly	UNITS:	ug/L
SAMPLE MATRIX:	WATER		

PARAMETER	RESULTS		
cis-1,3-DICHLOROPROPENE	1.0	U	
trans-1,3-DICHLOROPROPENE	1.0	U	
1,4-DIOXANE	100	U	UJ
ETHYL BENZENE	1.0	U	
ETHYL METHACRYLATE	50	U	
HEXACHLOROBUTADIENE	1.0	U	
2-HEXANONE (MBK)	20	U	
IODOMETHANE	5.0	U	UJ
ISOBUTYL ALCOHOL	50	U	UJ
ISOPROPYLBENZENE	50	U	
4-ISOPROPYLTOLUENE	1.0	U	
METHACRYLONITRILE	50	U	
METHYL METHACRYLATE	50	U	
4-METHYL-2-PENTANONE (MIBK)	20	U	
METHYLENE CHLORIDE	8.2	J,B	U
NAPHTHALENE	1.6	J,B	U
PROPIONITRILE	50	U	
N-PROPYLBENZENE	1.0	U	
STYRENE	1.0	U	
1,1,1,2-TETRACHLOROETHANE	1.0	U	
1,1,2,2-TETRACHLOROETHANE	1.0	U	
TETRACHLOROETHENE	17		
TETRAHYDROFURAN	1.0	U	
TOLUENE	1.0	U	
1,2,3-TRICHLOROBENZENE	1.0	U	
1,2,4-TRICHLOROBENZENE	1.0	U	
1,1,1-TRICHLOROETHANE	3.3		
1,1,2-TRICHLOROETHANE	1.0	U	
TRICHLOROETHENE	1.0	U	
TRICHLOROFLUOROMETHANE	2.0	U	
1,2,3-TRICHLOROPROPANE	1.0	U	
1,2,3-TRIMETHYLBENZENE	1.0	U	
1,2,4-TRIMETHYLBENZENE	1.0	U	
1,3,5-TRIMETHYLBENZENE	1.0	U	
VINYL ACETATE	1.0	U	
VINYL CHLORIDE	2.0	U	
O-XYLENE	1.0	U	
META & PARA XYLENES	2.0	U	

SURROGATES:	RECOVERY	LOWER LIMIT	UPPER LIMIT
1,2-DICHLOROETHANE-d4	110%	80	120
TOLUENE-D8	96%	88	110
BROMOFLUOROBENZENE	109%	86	115

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TEST:	EPA 8260	AEN I.D.:	97.01181-79291
CLIENT I.D.:	MW-5-97-2	DATE SAMPLED:	04/11/97
CLIENT:	ERM-West, Inc.	DATE RECEIVED:	04/12/97
PROJECT #:	6032.20	DATE ANALYZED:	04/17/97
PROJECT NAME:	Seattle ANGS Qtly	DILUTION FACTOR:	1
SAMPLE MATRIX:	WATER	UNITS:	ug/L

PARAMETER	RESULTS	
ACETONE	2.8	J,B UJ
ACETONITRILE	50	U UJ
ACROLEIN	50	U UJ
ACRYLONITRILE	50	U
ALLYL CHLORIDE	50	U
BENZENE	1.0	U
BROMOBENZENE	1.0	U
BROMOCHLOROMETHANE	1.0	U
BROMODICHLOROMETHANE	1.2	UJ
BROMOFORM	1.0	U
BROMOMETHANE	2.0	U
2-BUTANONE (MEK)	20	U
n-BUTYLBENZENE	1.0	U
sec-BUTYLBENZENE	1.0	U
tert-BUTYLBENZENE	1.0	U
CARBON DISULFIDE	1.0	U
CARBON TETRACHLORIDE	1.0	U
CHLOROBENZENE	1.0	U
CHLOROETHANE	1.0	U
2-CHLOROETHYL VINYL ETHER	10	U R
CHLOROFORM	1.3	UJ
CHLOROMETHANE	1.0	U
2-CHLOROTOLUENE	1.0	U
4-CHLOROTOLUENE	1.0	U
CYCLOHEXANE	1.0	U
DIBROMOCHLOROMETHANE	1.0	U
1,2-DIBROMO-3-CHLOROPROPANE	1.0	U
1,2-DIBROMOETHANE (EDB)	1.0	U
DIBROMOMETHANE	1.0	U
trans-1,4-DICHLORO-2-BUTENE	1.0	U
1,2-DICHLOROBENZENE	1.0	U
1,3-DICHLOROBENZENE	1.0	U
1,4-DICHLOROBENZENE	1.0	U
DICHLORODIFLUOROMETHANE	1.0	U
1,1-DICHLOROETHANE	1.0	U
1,2-DICHLOROETHANE (EDC)	1.0	U
1,1-DICHLOROETHENE	1.0	U
cis-1,2-DICHLOROETHENE	1.4	
trans-1,2-DICHLOROETHENE	1.0	U UJ
1,2-DICHLOROPROPANE	1.0	U
1,3-DICHLOROPROPANE	1.0	U
2,2-DICHLOROPROPANE	1.0	U
1,1-DICHLOROPROPENE	1.0	U

000112

KCSlip4 39731

SEA406261

TEST:	EPA 8260	AEN I.D.:	97.01181-79291
CLIENT I.D.:	MW-5-97-2	DATE SAMPLED:	04/11/97
CLIENT:	ERM-West, Inc.	DATE RECEIVED:	04/12/97
PROJECT #:	6032.20	DATE ANALYZED:	04/17/97
PROJECT NAME:	Seattle ANGS Qtly	DILUTION FACTOR:	1
SAMPLE MATRIX:	WATER	UNITS:	ug/L

PARAMETER	RESULTS		
cis-1,3-DICHLOROPROPENE	1.0	U	
trans-1,3-DICHLOROPROPENE	1.0	U	
1,4-DIOXANE	100	U	UJ
ETHYL BENZENE	1.0	U	
ETHYL METHACRYLATE	50	U	
HEXACHLOROBUTADIENE	1.0	U	
2-HEXANONE (MBK)	20	U	
IODOMETHANE	5.0	U	UJ
ISOBUTYL ALCOHOL	50	U	UJ
ISOPROPYLBENZENE	50	U	
4-ISOPROPYLTOLUENE	1.0	U	
METHACRYLONITRILE	50	U	
METHYL METHACRYLATE	50	U	
4-METHYL-2-PENTANONE (MIBK)	20	U	
METHYLENE CHLORIDE	5.9	J,B	U
NAPHTHALENE	1.5	J,B	U
PROPIONITRILE	50	U	
N-PROPYLBENZENE	1.0	U	
STYRENE	1.0	U	
1,1,1,2-TETRACHLOROETHANE	1.0	U	
1,1,2,2-TETRACHLOROETHANE	1.0	U	
TETRACHLOROETHENE	1.0	U	
TETRAHYDROFURAN	1.0	U	
TOLUENE	1.0	U	
1,2,3-TRICHLOROBENZENE	1.0	U	
1,2,4-TRICHLOROBENZENE	1.0	U	
1,1,1-TRICHLOROETHANE	1.0	U	
1,1,2-TRICHLOROETHANE	1.0	U	
TRICHLOROETHENE	1.0	U	
TRICHLOROFLUOROMETHANE	2.0	U	
1,2,3-TRICHLOROPROPANE	1.0	U	
1,2,3-TRIMETHYLBENZENE	1.0	U	
1,2,4-TRIMETHYLBENZENE	1.0	U	
1,3,5-TRIMETHYLBENZENE	1.0	U	
VINYL ACETATE	1.0	U	
VINYL CHLORIDE	2.0	U	
O-XYLENE	1.0	U	
META & PARA XYLENES	2.0	U	

SURROGATES:	RECOVERY	LOWER LIMIT	UPPER LIMIT
1,2-DICHLOROETHANE-d4	109%	80	120
TOLUENE-D8	95%	88	110
BROMOFLUOROBENZENE	108%	86	115

000713

:ST:	EPA 8260	AEN I.D.:	97.01181-79292
.IENT I.D.:	MW-5-97-2*	DATE SAMPLED:	04/11/97
.IENT:	ERM-West, Inc.	DATE RECEIVED:	04/12/97
ROJECT #:	6032.20	DATE ANALYZED:	04/17/97
ROJECT NAME:	Seattle ANGS Qtly	DILUTION FACTOR:	1
AMPLE MATRIX:	WATER	UNITS:	ug/L

RAMETER	RESULTS		
ETONE	3.1	J,B	U
ETONITRILE	50	U	UJ
ROLEIN	50	U	UJ
RYLONITRILE	50	U	
LYL CHLORIDE	50	U	
NZENE	1.0	U	
OMOBENZENE	1.0	U	
OMOCHLOROMETHANE	1.0	U	
OMODICHLOROMETHANE	0.55	J	U
OMOFORM	1.0	U	
OMOMETHANE	2.0	U	
BUTANONE (MEK)	20	U	
BUTYLBENZENE	1.0	U	
c-BUTYLBENZENE	1.0	U	
rt-BUTYLBENZENE	1.0	U	
ARBON DISULFIDE	1.0	U	
ARBON TETRACHLORIDE	1.0	U	
HLOROBENZENE	1.0	U	
HLOROETHANE	1.0	U	
CHLOROETHYL VINYL ETHER	10	U	R
HLOROFORM	0.59	J	U
HLOROMETHANE	1.0	U	
CHLOROTOLUENE	1.0	U	
CHLOROTOLUENE	1.0	U	
YCLOHEXANE	1.0	U	
BROMOCHLOROMETHANE	1.0	U	
2-DIBROMO-3-CHLOROPROPANE	1.0	U	
2-DIBROMOETHANE (EDB)	1.0	U	
BROMOMETHANE	1.0	U	
ans-1,4-DICHLORO-2-BUTENE	1.0	U	
2-DICHLOROBENZENE	1.0	U	
3-DICHLOROBENZENE	1.0	U	
4-DICHLOROBENZENE	1.0	U	
ICHLORODIFLUOROMETHANE	1.0	U	
1-DICHLOROETHANE	1.0	U	
2-DICHLOROETHANE (EDC)	1.0	U	
1-DICHLOROETHENE	1.0	U	
s-1,2-DICHLOROETHENE	1.6		
ans-1,2-DICHLOROETHENE	1.0	U	UJ
2-DICHLOROPROPANE	1.0	U	
3-DICHLOROPROPANE	1.0	U	
2-DICHLOROPROPANE	1.0	U	
1-DICHLOROPROPENE	1.0	U	

000114

TEST:	EPA 8260	AEN I.D.:	97.01181-79292
CLIENT I.D.:	MW-5-97-2*	DATE SAMPLED:	04/11/97
CLIENT:	ERM-West, Inc.	DATE RECEIVED:	04/12/97
PROJECT #:	6032.20	DATE ANALYZED:	04/17/97
PROJECT NAME:	Seattle ANGS Qtly	DILUTION FACTOR:	1
SAMPLE MATRIX:	WATER	UNITS:	ug/L

PARAMETER	RESULTS		
cis-1,3-DICHLOROPROPENE	1.0	U	
trans-1,3-DICHLOROPROPENE	1.0	U	
1,4-DIOXANE	100	U	UJ
ETHYL BENZENE	1.0	U	
ETHYL METHACRYLATE	50	U	
HEXACHLOROBUTADIENE	1.0	U	
2-HEXANONE (MBK)	20	U	
IODOMETHANE	5.0	U	UJ
ISOBUTYL ALCOHOL	50	U	UJ
ISOPROPYLBENZENE	50	U	UJ no
4-ISOPROPYLTOLUENE	1.0	U	
METHACRYLONITRILE	50	U	
METHYL METHACRYLATE	50	U	
4-METHYL-2-PENTANONE (MIBK)	20	U	
METHYLENE CHLORIDE	4.1	J,B	U
NAPHTHALENE	0.89	J,B	U
PROPIONITRILE	50	U	
N-PROPYLBENZENE	1.0	U	
STYRENE	1.0	U	
1,1,1,2-TETRACHLOROETHANE	1.0	U	
1,1,2,2-TETRACHLOROETHANE	1.0	U	
TETRACHLOROETHENE	1.0	U	
TETRAHYDROFURAN	1.0	U	
TOLUENE	1.0	U	
1,2,3-TRICHLOROBENZENE	1.0	U	
1,2,4-TRICHLOROBENZENE	1.0	U	
1,1,1-TRICHLOROETHANE	1.0	U	
1,1,2-TRICHLOROETHANE	1.0	U	
TRICHLOROETHENE	1.0	U	
TRICHLOROFLUOROMETHANE	2.0	U	
1,2,3-TRICHLOROPROPANE	1.0	U	
1,2,3-TRIMETHYLBENZENE	1.0	U	
1,2,4-TRIMETHYLBENZENE	1.0	U	
1,3,5-TRIMETHYLBENZENE	1.0	U	
VINYL ACETATE	1.0	U	
VINYL CHLORIDE	2.0	U	
O-XYLENE	1.0	U	
META & PARA XYLENES	2.0	U	

SURROGATES:	RECOVERY	LOWER LIMIT	UPPER LIMIT
1,2-DICHLOROETHANE-d4	112%	80	120
TOLUENE-D8	95%	88	110
BROMOFLUOROBENZENE	108%	86	115

000015

KCSlip4 39734

SEA406264

TEST:	EPA 8260	AEN I.D.:	97.01181-79293
CLIENT I.D.:	MW-3-97-2	DATE SAMPLED:	04/11/97
CLIENT:	ERM-West, Inc.	DATE RECEIVED:	04/12/97
PROJECT #:	6032.20	DATE ANALYZED:	04/17/97
PROJECT NAME:	Seattle ANGS Qtly	DILUTION FACTOR:	1
SAMPLE MATRIX:	WATER	UNITS:	ug/L

PARAMETER	RESULTS		
ACETONE	3.2	J,B	U
ACETONITRILE	50	U	UJ
ACROLEIN	50	U	UJ
ACRYLONITRILE	50	U	
ALLYL CHLORIDE	50	U	
BENZENE	1.0	U	
BROMOBENZENE	1.0	U	
BROMOCHLOROMETHANE	1.0	U	
BROMODICHLOROMETHANE	0.86	J	U
BROMOFORM	1.0	U	
BROMOMETHANE	2.0	U	
2-BUTANONE (MEK)	20	U	
n-BUTYLBENZENE	1.0	U	
sec-BUTYLBENZENE	1.0	U	
tert-BUTYLBENZENE	1.0	U	
CARBON DISULFIDE	1.0	U	
CARBON TETRACHLORIDE	1.0	U	
CHLOROBENZENE	1.0	U	
CHLOROETHANE	1.0	U	
2-CHLOROETHYL VINYL ETHER	10	U	R
CHLOROFORM	0.91	J	U
CHLOROMETHANE	1.0	U	
2-CHLOROTOLUENE	1.0	U	
4-CHLOROTOLUENE	1.0	U	
CYCLOHEXANE	1.0	U	
DIBROMOCHLOROMETHANE	1.0	U	
1,2-DIBROMO-3-CHLOROPROPANE	1.0	U	
1,2-DIBROMOETHANE (EDB)	1.0	U	
DIBROMOMETHANE	1.0	U	
trans-1,4-DICHLORO-2-BUTENE	1.0	U	
1,2-DICHLOROBENZENE	1.0	U	
1,3-DICHLOROBENZENE	1.0	U	
1,4-DICHLOROBENZENE	1.0	U	
DICHLORODIFLUOROMETHANE	1.0	U	
1,1-DICHLOROETHANE	1.0	U	
1,2-DICHLOROETHANE (EDC)	1.0	U	
1,1-DICHLOROETHENE	1.0	U	
cis-1,2-DICHLOROETHENE	1.0	U	
trans-1,2-DICHLOROETHENE	1.0	U	UJ
1,2-DICHLOROPROPANE	1.0	U	
1,3-DICHLOROPROPANE	1.0	U	
2,2-DICHLOROPROPANE	1.0	U	
1,1-DICHLOROPROPENE	1.0	U	

000015

TEST:	EPA 8260	AEN I.D.:	97.01181-79293
CLIENT I.D.:	MW-3-97-2	DATE SAMPLED:	04/11/97
CLIENT:	ERM-West, Inc.	DATE RECEIVED:	04/12/97
PROJECT #:	6032.20	DATE ANALYZED:	04/17/97
PROJECT NAME:	Seattle ANGS Qtly	DILUTION FACTOR:	1
SAMPLE MATRIX:	WATER	UNITS:	ug/L

PARAMETER	RESULTS	
cis-1,3-DICHLOROPROPENE	1.0	U
trans-1,3-DICHLOROPROPENE	1.0	U
1,4-DIOXANE	100	U UJ
ETHYL BENZENE	1.0	U
ETHYL METHACRYLATE	50	U
HEXACHLOROBUTADIENE	1.0	U
2-HEXANONE (MBK)	20	U
IODOMETHANE	5.0	U UJ
ISOBUTYL ALCOHOL	50	U UJ
ISOPROPYLBENZENE	50	U
4-ISOPROPYLTOLUENE	1.0	U
METHACRYLONITRILE	50	U
METHYL METHACRYLATE	50	U
4-METHYL-2-PENTANONE (MIBK)	20	U
METHYLENE CHLORIDE	8.2	J,B U
NAPHTHALENE	1.4	J,B U
PROPIONITRILE	50	U
N-PROPYLBENZENE	1.0	U
STYRENE	1.0	U
1,1,1,2-TETRACHLOROETHANE	1.0	U
1,1,2,2-TETRACHLOROETHANE	1.0	U
TETRACHLOROETHENE	1.0	U
TETRAHYDROFURAN	1.0	U
TOLUENE	1.0	U
1,2,3-TRICHLOROBENZENE	1.0	U
1,2,4-TRICHLOROBENZENE	1.0	U
1,1,1-TRICHLOROETHANE	1.0	U
1,1,2-TRICHLOROETHANE	1.0	U
TRICHLOROETHENE	1.0	U
TRICHLOROFLUOROMETHANE	2.0	U
1,2,3-TRICHLOROPROPANE	1.0	U
1,2,3-TRIMETHYLBENZENE	1.0	U
1,2,4-TRIMETHYLBENZENE	1.0	U
1,3,5-TRIMETHYLBENZENE	1.0	U
VINYL ACETATE	1.0	U
VINYL CHLORIDE	2.0	U
O-XYLENE	1.0	U
META & PARA XYLENES	0.51	J

SURROGATES:	RECOVERY	LOWER LIMIT	UPPER LIMIT
1,2-DICHLOROETHANE-d4	111%	80	120
TOLUENE-D8	96%	88	110
BROMOFLUOROBENZENE	109%	86	115

090317

KCSlip4 39736

SEA406266

		AEN I.D.:	97.01181-79294
TEST:	EPA 8260	DATE SAMPLED:	04/11/97
CLIENT I.D.:	MW-4-97-2	DATE RECEIVED:	04/12/97
CLIENT:	ERM-West, Inc.	DATE ANALYZED:	04/17/97
PROJECT #:	6032.20	DILUTION FACTOR:	1
PROJECT NAME:	Seattle ANGS Qtly	UNITS:	ug/L
SAMPLE MATRIX:	WATER		

PARAMETER	RESULTS	
ACETONE	2.4	J,B UJ
ACETONITRILE	50	U UJ
ACROLEIN	50	U UJ
ACRYLONITRILE	50	U
ALLYL CHLORIDE	50	U
BENZENE	1.0	U
BROMOBENZENE	1.0	U
BROMOCHLOROMETHANE	1.0	U
BROMODICHLOROMETHANE	1.4	U
BROMOFORM	1.0	U
BROMOMETHANE	2.0	U
2-BUTANONE (MEK)	20	U
n-BUTYLBENZENE	1.0	U
sec-BUTYLBENZENE	1.0	U
tert-BUTYLBENZENE	1.0	U
CARBON DISULFIDE	1.0	U
CARBON TETRACHLORIDE	1.0	U
CHLOROBENZENE	1.0	U
CHLOROETHANE	1.0	U
2-CHLOROETHYL VINYL ETHER	10	U ~~UJ~~ R (RCL)
CHLOROFORM	1.4	U
CHLOROMETHANE	1.0	U
2-CHLOROTOLUENE	1.0	U
4-CHLOROTOLUENE	1.0	U
CYCLOHEXANE	1.0	U
DIBROMOCHLOROMETHANE	1.0	U
1,2-DIBROMO-3-CHLOROPROPANE	1.0	U
1,2-DIBROMOETHANE (EDB)	1.0	U
DIBROMOMETHANE	1.0	U
trans-1,4-DICHLORO-2-BUTENE	1.0	U
1,2-DICHLOROBENZENE	1.0	U
1,3-DICHLOROBENZENE	1.0	U
1,4-DICHLOROBENZENE	1.0	U
DICHLORODIFLUOROMETHANE	1.0	U
1,1-DICHLOROETHANE	1.0	U
1,2-DICHLOROETHANE (EDC)	1.0	U
1,1-DICHLOROETHENE	1.0	U
cis-1,2-DICHLOROETHENE	0.56	J
trans-1,2-DICHLOROETHENE	1.0	U UJ
1,2-DICHLOROPROPANE	1.0	U
1,3-DICHLOROPROPANE	1.0	U
2,2-DICHLOROPROPANE	1.0	U
1,1-DICHLOROPROPENE	1.0	U

000018

KCSlip4 39737

SEA406267

		AEN I.D.:	97.01181-79294
TEST:	EPA 8260	DATE SAMPLED:	04/11/97
CLIENT I.D.:	MW-4-97-2	DATE RECEIVED:	04/12/97
CLIENT:	ERM-West, Inc.	DATE ANALYZED:	04/17/97
PROJECT #:	6032.20	DILUTION FACTOR:	1
PROJECT NAME:	Seattle ANGS Qtly	UNITS:	ug/L
SAMPLE MATRIX:	WATER		

PARAMETER	RESULTS		
cis-1,3-DICHLOROPROPENE	1.0	U	
trans-1,3-DICHLOROPROPENE	1.0	U	
1,4-DIOXANE	100	U	UJ
ETHYL BENZENE	1.0	U	
ETHYL METHACRYLATE	50	U	
HEXACHLOROBUTADIENE	1.0	U	
2-HEXANONE (MBK)	20	U	
IODOMETHANE	5.0	U	UJ
ISOBUTYL ALCOHOL	50	U	UJ
ISOPROPYLBENZENE	50	U	
4-ISOPROPYLTOLUENE	1.0	U	
METHACRYLONITRILE	50	U	
METHYL METHACRYLATE	50	U	
4-METHYL-2-PENTANONE (MIBK)	20	U	
METHYLENE CHLORIDE	4.6	J,B	U
NAPHTHALENE	1.1	J,B	U
PROPIONITRILE	50	U	
N-PROPYLBENZENE	1.0	U	
STYRENE	1.0	U	
1,1,1,2-TETRACHLOROETHANE	1.0	U	
1,1,2,2-TETRACHLOROETHANE	1.0	U	
TETRACHLOROETHENE	1.0	U	
TETRAHYDROFURAN	1.0	U	
TOLUENE	1.0	U	
1,2,3-TRICHLOROBENZENE	1.0	U	
1,2,4-TRICHLOROBENZENE	1.0	U	
1,1,1-TRICHLOROETHANE	1.0	U	
1,1,2-TRICHLOROETHANE	1.0	U	
TRICHLOROETHENE	3.2		
TRICHLOROFLUOROMETHANE	2.0	U	
1,2,3-TRICHLOROPROPANE	1.0	U	
1,2,3-TRIMETHYLBENZENE	1.0	U	
1,2,4-TRIMETHYLBENZENE	1.0	U	
1,3,5-TRIMETHYLBENZENE	1.0	U	
VINYL ACETATE	1.0	U	
VINYL CHLORIDE	2.0	U	
O-XYLENE	1.0	U	
META & PARA XYLENES	2.0	U	

SURROGATES:	RECOVERY	LOWER LIMIT	UPPER LIMIT
1,2-DICHLOROETHANE-d4	111%	80	120
TOLUENE-D8	96%	88	110
BROMOFLUOROBENZENE	109%	86	115

000319

KCSlip4 39738

SEA406268

DATA VALIDATION REPORT FOR SEMIVOLATILE ORGANIC COMPOUND ANALYTICAL RESULTS FOR SAMPLES COLLECTED ON APRIL 11, 1997, FROM THE SEATTLE AIR NATIONAL GUARD STATION IN SEATTLE, WASHINGTON

AMERICAN ENVIRONMENTAL NETWORK LABORATORY - DURHAM, OREGON
WORK ORDER NO. 97.01181

Prepared for
Air National Guard

January 1998

ERM File: 1181SVOA.doc

KCSlip4 39739

SEA406269

NARRATIVE

Environmental Resources Management (ERM) collected four water samples and one duplicate sample from the Air National Guard Station in Seattle, Washington, on April 11, 1997. The samples were relinquished by ERM to the laboratory courier under documented chain of custody on April 11, 1997, for transport to American Environmental Network Laboratory (AEN) in Durham, Oregon.

The samples included in the validatable data package for this sample delivery group (SDG) were characterized as follows:

ERM Sample ID	Laboratory Sample ID	Level/ Matrix	Date Collected
BS-004PZ-97-2	79288	low/water	4/11/97
MW-5-97-2	79291	low/water	4/11/97
MW-5-97-2*	79292	low/water	4/11/97
MW-3-97-2	79293	low/water	4/11/97
MW-4-97-2	79294	low/water	4/11/97

AEN selected sample BS-004PZ-97-2 for the matrix spike/matrix spike duplicate sample pair. Sample MW-5-97-2* was the duplicate sample.

Semivolatile organic compound data were acquired according to the USEPA SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, "Method 8270" (November 1986, Third Edition, Volume 1B, Revision 2, September 1994).

Validation of these data was based on the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review* (Office of Solid Waste and Emergency Response, Publication 9240.1-05, PB94-9635-1, EPA-540/R-94/012, US Environmental Protection Agency, Washington, D. C., February 1993). (Organic Functional Guidelines).

The areas reviewed during the data validation procedure are listed below:

I. Sample Preservation and Holding Times

II. GC/MS Instrument Performance Check

III. Initial Calibration

IV. Continuing Calibration

V. Blanks

VI. Surrogate Spikes

VII. Matrix Spike/Matrix Spike Duplicates

VIII. Laboratory Control Samples

IX. Regional Quality Assurance and Quality Control

X. Internal Standards

XI. Target Compound Identification

XII. Compound Quantitation and Contract Required Quantitation Limits (CRQLs)

XIII. Tentatively Identified Compounds

XIV. System Performance

XV. Field Duplicates

XVI. Overall Assessment of Data

XVII. Documentation

All laboratory results have been accepted (unqualified), qualified, or rejected.

- Unqualified results are valid for the specified procedures and may be used without reservations.
- Qualified results are usable with the indicated limitation.
- Rejected results are unusable. The analyte may or may not be present. Resampling and reanalysis will be necessary for verification.

Qualified and rejected results are annotated in accordance with the Organic Functional Guidelines using the following codes:

U	The analyte was analyzed for but was not detected above the reported value.
J	The reported value is an estimate.
R	The data are unusable. The presence or absence of the analyte cannot be verified from the existing data. Resampling and reanalysis are necessary for verification.
N	There is presumptive evidence to make a tentative identification.

NJ There is presumptive evidence to make a tentative identification; the reported value is an estimate.

UJ The analyte was analyzed for but was not detected above the reported value; the reported value is an estimate.

DATA VALIDATION RESULTS

I. SAMPLE PRESERVATION AND HOLDING TIMES

AEN provided ERM with 1-liter amber glass sample containers. The water samples were extracted within the 7-day holding time specified by Method 8270, and the resultant sample extracts were analyzed within the specified 40-day holding time from the date of extraction.

No data were qualified or rejected based on improper sample preservation or exceedance of specified holding times.

II. GC/MS INSTRUMENT PERFORMANCE CHECK

Compliance with the decafluorotriphenylphosphine (DFTPP) instrument tuning criteria was demonstrated for each GC/MS used at the beginning of each 12-hour shift during which standards, samples, or associated quality control samples were analyzed.

All semivolatile organic compound analytical work was performed on one GC/MS instrument.

DFTPP ion abundance criteria were met as follows:

GC/MS Instrument ID	Date	Time
5972 Semi	4/24/97 4/24/97	0854 2010

No data were qualified or rejected based on instrument tuning.

III. INITIAL CALIBRATION

The GC/MS employed for samples and associated quality control samples was calibrated at five concentration levels. Each calibration standard contained all target compounds, surrogates, and internal standards.

The initial calibration is summarized below:

GC/MS Instrument ID	Date	Time
5972 Semi	4/23/97	0952 - 1759

Method 8270 does not specify minimum relative response factors (RRF) for each target compound; a minimum RRF of 0.05 was used to evaluate the sensitivity and response of the instrument to each target compound. All RRFs for target compounds and surrogates were greater than or equal to 0.05.

All percent relative standard deviations (%RSD) were less than or equal to 30 percent.

No data were qualified or rejected based on this initial calibration.

IV. CONTINUING CALIBRATION

The GC/MS was calibrated for each subsequent 12-hour shift during which samples or associated quality control samples in this SDG were analyzed. Each continuing calibration was performed at one concentration level with a standard containing all target compounds, all surrogates, and all internal standards.

The continuing calibrations are summarized below:

GC/MS Instrument ID	Date	Time
5972 Semi	4/24/97 4/24/97	0922 2038

All RRFs for target compounds and surrogates were greater than or equal to 0.05, with the following exceptions:

Date	Time	Analyte	RRF
4/24/97	0922	Indeno(1,2,3-cd)anthracene	0.00
		Dibenz(a,h)anthracene	0.00
		Benzo(g,h,i)perylene	0.00
	2038	Indeno(1,2,3-cd)anthracene	0.00
		Dibenz(a,h)anthracene	0.00
		Benzo(g,h,i)perylene	0.00

Percent differences (%D) for all target compounds were 25 percent or less, with the following exceptions:

Date	Time	Compound	% D
4/2/97	0922	3-Nitroaniline	27.9
	2038	3-Nitroaniline	30.6

None of the target compounds in the above two tables were detected in the associated samples. Nondetects for indeno(1,2,3-cd)anthracene, dibenz(a,h)anthracene, benzo(g,h,i)perylene, and 3-nitroaniline in the associated samples were qualified as estimated detection limit, "UJ."

V. BLANKS

The following method blank was associated with the samples in this SDG:

Blank ID	Level/ Matrix	Date Extracted	GC/MS Instrument ID	Analysis Date	Time
0421-MB	low/water	4/21/97	5972 Semi	4/24/96	1514

The following target compound was reported in the method blank:

Analyte	Concentration µg/l
bis (2-Ethylhexyl)phthalate	1.7 J

Application of the USEPA 10X rule for the common laboratory contaminants (including common phthalate contaminants) resulted in the following target compounds being qualified as nondetect ("U") at the reported concentration:

ERM Sample ID	Compound	Concentration µg/l
MW5-97-2	bis (2-Ethylhexyl)phthalate	1.6 JB
MW5-97-2*	bis (2-Ethylhexyl)phthalate	2.1 JB
MW3-97-2	bis (2-Ethylhexyl)phthalate	3.9 JB

The field blank (BS-006PZ-97-2*) associated with the validated samples was not included in the validatable data package. However, the results from this blank were reviewed. No target compounds were reported in the field blank. An equipment rinsate blank was not submitted with this SDG.

VI. SURROGATE SPIKES

All surrogate percent recoveries (%R) were within the specified quality control limits, with the following exception:

ERM Sample ID	Surrogate	% R	Control Limits %R
MW-3-97-2	2-Fluorophenol	19	21 - 100

The Organic Functional Guidelines allow one semivolatile organic compound surrogate recovery per sample to be outside acceptable limits before data must be qualified. Following this guideline, no data were qualified or rejected based on surrogate spike recoveries.

VII. MATRIX SPIKE AND MATRIX SPIKE DUPLICATES

The following matrix spike/matrix spike duplicate (MS/MSD) sample pair was associated with this SDG:

ERM Sample ID	Level/ Matrix	Date Extracted	GC/MS Instrument ID	Date Analyzed	Time
BS-004PZ-97-2MS	low/water	4/21/97	5972 Semi	4/24/97	1837
BS-004PZ-97-2MSD	low/water	4/21/97	5972 Semi	4/24/97	1927

The MS/MSD %Rs and relative percent differences (RPD) were within specified quality control limits; therefore, no data were qualified or rejected based on MS/MSD %Rs or RPDs.

VIII. LABORATORY CONTROL SAMPLES

The following laboratory control sample/laboratory control sample duplicate (LCS/LCSD) pair was associated with the samples analyzed for semivolatile organic compounds in this SDG:

Sample ID	Level/ Matrix	Date Extracted	GC/MS Instrument ID	Date Analyzed	Time
WLCS 42197	low/water	4/21/97	5972 Semi	4/24/97	1656
WLCSD 42197	low/water	4/21/97	5972 Semi	4/24/97	1514

The LCS/LCSD %Rs and RPDs were within specified quality control limits; therefore, no data were qualified or rejected based on LCS/LCSD %Rs or RPDs.

IX. REGIONAL QUALITY ASSURANCE AND QUALITY CONTROL

No USEPA regional quality assurance and quality control samples were required for this investigation; these samples are typically required only for USEPA Superfund investigations.

X. INTERNAL STANDARDS

All internal standard area counts and retention times were within 50 to 200 percent and ±30 seconds, respectively, of those in the associated initial calibration standard midpoint, with the following exception:

Sample ID	Internal Standard	Percent of ICV Response
0421 LCS	Perylene-d12	21.2
MW-4-97-2	Perylene-d12	23.7

Each compound associated with the perylene-d12 internal standard was nondetect. The target compounds associated with internal standard perylene-d12 in sample MW-4-97-2 were qualified as estimated detection limit, "UJ." The LCS data were not qualified; the low internal standard response in this sample does not impact the quality of the associated data.

XI. TARGET COMPOUND IDENTIFICATION

All target compound identifications were acceptable with regard to the supporting analytical data.

XII. COMPOUND QUANTITATION AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQLs)

All target compound quantitations were acceptable with regard to the supporting analytical data. The laboratory's practical quantitation limits met the CRQLs listed in the project Quality Assurance Project Plan.

XIII. TENTATIVELY IDENTIFIED COMPOUNDS (TICs)

No TICs were reported in this SDG.

XIV. SYSTEM PERFORMANCE

No marked changes were observed in instrument performance during the analysis of the samples in this SDG, as determined by the validation.

XV. FIELD DUPLICATES

The field duplicate sample results in this SDG agreed with the associated primary sample results. Both the primary and field duplicate results were ND for each of the target compounds with one exception. The target compound bis(2-ethylhexyl)phthalate was reported in both samples and qualified as "U" in both samples based on a similar detection in an associated blank sample. These results indicate minimal heterogeneity in the sample matrix.

XVI. OVERALL ASSESSMENT OF DATA

The Validated Data section of this report provides the semivolatile organic compound analysis data sheets for this SDG which include all data validation qualifiers applied by ERM.

Twenty-seven non-detect data points for eleven target compounds were qualified as estimated detection limit, "UJ." Three data points for one target compound were qualified as not detected, "U." No data were rejected.

XVII. DOCUMENTATION

The data package deliverables and analytical requirements specified in the SW-846 method protocols were met for this data set.

VALIDATED DATA

This section provides the semivolatile organic compound analysis data sheets with the data validation qualifiers applied by ERM (15 sheets total).

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: American Environmental Network, Inc.
Instrument ID: 5972 SEMI
GC Column:DB5-MS, .25mm
Matrix: WATER
Sample Vol.: 1 Liter
Extract Final Volume = 1.0ml

Lab Job I.D.: 97.01181
Lab Sample I.D: 79288
Lab File ID: 04249712
Date Analyzed: 04/24/97
Dilution Factor: 1
Concentration Units: ug/L

	COMPOUND	MRL	CONCENTRATION
1	Pyridine	5.00	U
2	N-Nitrosodimethylamine	5.00	U
3	2-Picoline	5.00	U
4	Methyl methanesulfonate	5.00	U
5	Ethyl methanesulfonate	5.00	U
6	Phenol	5.00	U
7	Aniline	5.00	U
8	bis(2-Chloroethyl)ether	5.00	U
9	2-Chlorophenol	5.00	U
10	1,3-Dichlorobenzene	5.00	U
11	1,4-Dichlorobenzene	5.00	U
12	1,2-Dichlorobenzene	5.00	U
13	Benzyl alcohol	5.00	U
14	2-Methylphenol (o-cresol)	5.00	U
15	bis(2-chloroisopropyl)ether	5.00	U
16	3&4-Methylphenol (m&p-cresol)	5.00	U
17	N-Nitroso-di-n-propylamine	5.00	U
18	Hexachloroethane	5.00	U
19	Acetophenone	5.00	U
20	Nitrobenzene	5.00	U
21	N-Nitrosopiperidine	5.00	U
22	Isophorone	5.00	U
23	2-Nitrophenol	5.00	U
24	2,4-Dimethylphenol	5.00	U
25	bis(2-Chloroethoxy)methane	5.00	U
26	Benzoic Acid	5.00	U
27	2,4-Dichlorophenol	5.00	U
28	1,2,4-Trichlorobenzene	5.00	U
29	Naphthalene	5.00	U
30	4-Chloroaniline	5.00	U
31	2,6-Dichlorophenol	5.00	U
32	Hexachlorobutadiene	5.00	U
33	a,a-Dimethyl phenylamine	5.00	U
34	N-Nitroso-di-n-butylamine	5.00	U
35	4-Chloro-3-methylphenol	5.00	U
36	2-Methylnaphthalene	5.00	U

000323

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: American Environmental Network, Inc.
Instrument ID: 5972 SEMI
GC Column:DB5-MS, .25mm
Matrix: WATER
Sample Vol.: 1 Liter
Extract Final Volume = 1.0ml

Lab Job I.D.: 97.01181
Lab Sample I.D: 79288
Lab File ID: 04249712
Date Analyzed: 04/24/97
Dilution Factor: 1
Concentration Units: ug/L

COMPOUND	MRL	CONCENTRATION
37 Hexachlorocyclopentadiene	5.00	U
38 1,2,4,5-Tetrachlorobenzene	5.00	U
39 2,4,6-Trichlorophenol	5.00	U
40 2,4,5-Trichlorophenol	5.00	U
41 2-Chloronaphthalene	5.00	U
42 1-Chloronaphthalene	5.00	U
43 2-Nitroaniline	5.00	U
44 Dimethylphthalate	5.00	U
45 Pentachlorobenzene	5.00	U
46 2,6-Dinitrotoluene	5.00	U
47 Acenaphthylene	5.00	U
48 3-Nitroaniline	5.00	U US
49 Acenaphthene	5.00	U
50 2,4-Dinitrophenol	5.00	U
51 4-Nitrophenol	5.00	U
52 Dibenzofuran	5.00	U
53 2,4-Dinitrotoluene	5.00	U
54 2-Naphthalamine	NA	
55 2,3,4,6-Tetrachlorophenol	5.00	U
56 1-Naphtylamine	NA	
57 Diethylphthalate	5.00	U
58 4-Chlorophenyl-phenylether	5.00	U
59 Fluorene	5.00	U
60 4-Nitroaniline	5.00	U
61 4,6-Dinitro-2-methylphenol	5.00	U
62 N-Nitrosodiphenylamine & Diphenylamine	5.00	U
63 1,2-Diphenylhydrazine	5.00	U
64 Phenacetin	5.00	U
65 4-Bromophenyl-phenylether	5.00	U
66 Hexachlorobenzene	5.00	U
67 Pentachlorophenol	5.00	U
68 4-Aminobiphenyl	5.00	U
69 Pentachloronitrobenzene	5.00	U
70 Pronamide	5.00	U
71 Phenanthrene	5.00	U
72 Anthracene	5.00	U
73 Di-n-butylphthalate	5.00	U

000324

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: American Environmental Network, Inc.
Instrument ID: 5972 SEMI
GC Column:DB5-MS, .25mm
Matrix: WATER
Sample Vol.: 1 Liter
Extract Final Volume = 1.0ml

Lab Job I.D.: 97.01181
Lab Sample I.D: 79288.
Lab File ID: 04249712
Date Analyzed: 04/24/97
Dilution Factor: 1
Concentration Units: ug/L

COMPOUND	MRL	CONCENTRATION
74 Fluoranthene	5.00	U
75 Benzidine	NA	
76 Pyrene	5.00	U
77 p-Dimethylaminozobenzene	5.00	U
78 Butylbenzylphthalate	5.00	U
79 3,3'-Dichlorobenzidine	5.00	U
80 Bis(2-ethylhexyl)phthalate	5.00	U
81 Benzo[a]anthracene	5.00	U
82 Chrysene	5.00	U
83 Di-n-octylphthalate	5.00	U
84 7,12-Dimethylbenz(a)anthracene	5.00	U
85 Benzo[b]fluoranthene	5.00	U
86 Benzo[k]fluoranthene	5.00	U
87 Benzo[a]pyrene	5.00	U
88 Dibenz(a,j)acridine	5.00	U
89 3-Methyl cholanthrene	5.00	U
90 Indeno[1,2,3-cd]pyrene	5.00	U UJ
91 Dibenz[a,h]anthracene	5.00	U UJ
92 Benzo[g,h,i]perylene	5.00	U UJ

SURROGATES:		LIMITS
2-Fluorophenol	31%	21-100%
Phenol-d5	22%	10-94%
Nitrobenzene-d5	61%	35-114%
2-Fluorobiphenyl	67%	43-116%
2,4,6-Tribromophenol	66%	10-123%
Terphenyl-d14	68%	33-141%

000025

KCSlip4 39752

SEA406282

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: American Environmental Network, Inc.
Instrument ID: 5972 SEMI
GC Column:DB5-MS, .25mm
Matrix: WATER
Sample Vol.: 1 Liter
Extract Final Volume = 1.0ml

Lab Job I.D.: 97.01181
Lab Sample I.D:79291
Lab File ID: 04249719
Date Analyzed: 04/24/97
Dilution Factor: 1
Concentration Units: ug/L

	COMPOUND	MRL	CONCENTRATION
1	Pyridine	5.00	U
2	N-Nitrosodimethylamine	5.00	U
3	2-Picoline	5.00	U
4	Methyl methanesulfonate	5.00	U
5	Ethyl methanesulfonate	5.00	U
6	Phenol	5.00	U
7	Aniline	5.00	U
8	bis(2-Chloroethyl)ether	5.00	U
9	2-Chlorophenol	5.00	U
10	1,3-Dichlorobenzene	5.00	U
11	1,4-Dichlorobenzene	5.00	U
12	1,2-Dichlorobenzene	5.00	U
13	Benzyl alcohol	5.00	U
14	2-Methylphenol (o-cresol)	5.00	U
15	bis(2-chloroisopropyl)ether	5.00	U
16	3&4-Methylphenol (m&p-cresol)	5.00	U
17	N-Nitroso-di-n-propylamine	5.00	U
18	Hexachloroethane	5.00	U
19	Acetophenone	5.00	U
20	Nitrobenzene	5.00	U
21	N-Nitrosopiperidine	5.00	U
22	Isophorone	5.00	U
23	2-Nitrophenol	5.00	U
24	2,4-Dimethylphenol	5.00	U
25	bis(2-Chloroethoxy)methane	5.00	U
26	Benzoic Acid	5.00	U
27	2,4-Dichlorophenol	5.00	U
28	1,2,4-Trichlorobenzene	5.00	U
29	Naphthalene	5.00	U
30	4-Chloroaniline	5.00	U
31	2,6-Dichlorophenol	5.00	U
32	Hexachlorobutadiene	5.00	U
33	a,a-Dimethyl phenylamine	5.00	U
34	N-Nitroso-di-n-butylamine	5.00	U
35	4-Chloro-3-methylphenol	5.00	U
36	2-Methylnaphthalene	5.00	U

000027

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: American Environmental Network, Inc.
Instrument ID: 5972 SEMI
GC Column:DB5-MS, .25mm
Matrix: WATER
Sample Vol.: 1 Liter
Extract Final Volume = 1.0ml

Lab Job I.D.: 97.01181
Lab Sample I.D:79291
Lab File ID: 04249719
Date Analyzed: 04/24/97
Dilution Factor: 1
Concentration Units: ug/L

	COMPOUND	MRL	CONCENTRATION
37	Hexachlorocyclopentadiene	5.00	U
38	1,2,4,5-Tetrachlorobenzene	5.00	U
39	2,4,6-Trichlorophenol	5.00	U
40	2,4,5-Trichlorophenol	5.00	U
41	2-Chloronaphthalene	5.00	U
42	1-Chloronaphthalene	5.00	U
43	2-Nitroaniline	5.00	U
44	Dimethylphthalate	5.00	U
45	Pentachlorobenzene	5.00	U
46	2,6-Dinitrotoluene	5.00	U
47	Acenaphthylene	5.00	U
48	3-Nitroaniline	5.00	U NJ
49	Acenaphthene	5.00	U
50	2,4-Dinitrophenol	5.00	U
51	4-Nitrophenol	5.00	U
52	Dibenzofuran	5.00	U
53	2,4-Dinitrotoluene	5.00	U
54	2-Naphthalamine	NA	
55	2,3,4,6-Tetrachlorophenol	5.00	U
56	1-Naphtylamine	NA	
57	Diethylphthalate	5.00	U
58	4-Chlorophenyl-phenylether	5.00	U
59	Fluorene	5.00	U
60	4-Nitroaniline	5.00	U
61	4,6-Dinitro-2-methylphenol	5.00	U
62	N-Nitrosodiphenylamine & Diphenylamine	5.00	U
63	1,2-Diphenylhydrazine	5.00	U
64	Phenacetin	5.00	U
65	4-Bromophenyl-phenylether	5.00	U
66	Hexachlorobenzene	5.00	U
67	Pentachlorophenol	5.00	U
68	4-Aminobiphenyl	5.00	U
69	Pentachloronitrobenzene	5.00	U
70	Pronamide	5.00	U
71	Phenanthrene	5.00	U
72	Anthracene	5.00	U
73	Di-n-butylphthalate	5.00	U

000028

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: American Environmental Network, Inc.
Instrument ID: 5972 SEMI
GC Column:DB5-MS, .25mm
Matrix: WATER
Sample Vol.: 1 Liter
Extract Final Volume = 1.0ml

Lab Job I.D.: 97.01181
Lab Sample I.D:79291
Lab File ID: 04249719
Date Analyzed: 04/24/97
Dilution Factor: 1
Concentration Units: ug/L

	COMPOUND	MRL	CONCENTRATION	
74	Fluoranthene	5.00	U	
75	Benzidine	NA		
76	Pyrene	5.00	U	
77	p-Dimethylaminozobenzene	5.00	U	
78	Butylbenzylphthalate	5.00	U	
79	3,3'-Dichlorobenzidine	5.00	U	
80	Bis(2-ethylhexyl)phthalate	5.00	1.6	B,J U
81	Benzo[a]anthracene	5.00	U	
82	Chrysene	5.00	U	
83	Di-n-octylphthalate	5.00	U	
84	7,12-Dimethylbenz(a)anthracene	5.00	U	
85	Benzo[b]fluoranthene	5.00	U	
86	Benzo[k]fluoranthene	5.00	U	
87	Benzo[a]pyrene	5.00	U	
88	Dibenz(a,j)acridine	5.00	U	
89	3-Methyl cholanthrene	5.00	U	
90	Indeno[1,2,3-cd]pyrene	5.00	U UJ	
91	Dibenz[a,h]anthracene	5.00	U UJ	
92	Benzo[g,h,i]perylene	5.00	U UJ	

SURROGATES:		LIMITS
2-Fluorophenol	24%	21-100%
Phenol-d5	18%	10-94%
Nitrobenzene-d5	63%	35-114%
2-Fluorobiphenyl	70%	43-116%
2,4,6-Tribromophenol	59%	10-123%
Terphenyl-d14	67%	33-141%

H = Surrogate Recovery is outside Control Limit.

000029

KCSlip4 39755

SEA406285

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: American Environmental Network, Inc.
Instrument ID: 5972 SEMI
GC Column:DB5-MS, .25mm
Matrix: WATER
Sample Vol.: 1 Liter
Extract Final Volume = 1.0ml

Lab Job I.D.: 97.01181
Lab Sample I.D:79292
Lab File ID: 04249720
Date Analyzed: 04/24/97
Dilution Factor: 1
Concentration Units: ug/L

	COMPOUND	MRL	CONCENTRATION
1	Pyridine	5.00	U
2	N-Nitrosodimethylamine	5.00	U
3	2-Picoline	5.00	U
4	Methyl methanesulfonate	5.00	U
5	Ethyl methanesulfonate	5.00	U
6	Phenol	5.00	U
7	Aniline	5.00	U
8	bis(2-Chloroethyl)ether	5.00	U
9	2-Chlorophenol	5.00	U
10	1,3-Dichlorobenzene	5.00	U
11	1,4-Dichlorobenzene	5.00	U
12	1,2-Dichlorobenzene	5.00	U
13	Benzyl alcohol	5.00	U
14	2-Methylphenol (o-cresol)	5.00	U
15	bis(2-chloroisopropyl)ether	5.00	U
16	3&4-Methylphenol (m&p-cresol)	5.00	U
17	N-Nitroso-di-n-propylamine	5.00	U
18	Hexachloroethane	5.00	U
19	Acetophenone	5.00	U
20	Nitrobenzene	5.00	U
21	N-Nitrosopiperidine	5.00	U
22	Isophorone	5.00	U
23	2-Nitrophenol	5.00	U
24	2,4-Dimethylphenol	5.00	U
25	bis(2-Chloroethoxy)methane	5.00	U
26	Benzoic Acid	5.00	U
27	2,4-Dichlorophenol	5.00	U
28	1,2,4-Trichlorobenzene	5.00	U
29	Naphthalene	5.00	U
30	4-Chloroaniline	5.00	U
31	2,6-Dichlorophenol	5.00	U
32	Hexachlorobutadiene	5.00	U
33	a,a-Dimethyl phenylamine	5.00	U
34	N-Nitroso-di-n-butylamine	5.00	U
35	4-Chloro-3-methylphenol	5.00	U
36	2-Methylnaphthalene	5.00	U

000030

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: American Environmental Network, Inc.
Instrument ID: 5972 SEMI
GC Column:DB5-MS, .25mm
Matrix: WATER
Sample Vol.: 1 Liter
Extract Final Volume = 1.0ml

Lab Job I.D.: 97.01181
Lab Sample I.D:79293
Lab File ID: 04249721
Date Analyzed: 04/25/97
Dilution Factor: 1
Concentration Units: ug/L

	COMPOUND	MRL	CONCENTRATION
1	Pyridine	5.00	U
2	N-Nitrosodimethylamine	5.00	U
3	2-Picoline	5.00	U
4	Methyl methanesulfonate	5.00	U
5	Ethyl methanesulfonate	5.00	U
6	Phenol	5.00	U
7	Aniline	5.00	U
8	bis(2-Chloroethyl)ether	5.00	U
9	2-Chlorophenol	5.00	U
10	1,3-Dichlorobenzene	5.00	U
11	1,4-Dichlorobenzene	5.00	U
12	1,2-Dichlorobenzene	5.00	U
13	Benzyl alcohol	5.00	U
14	2-Methylphenol (o-cresol)	5.00	U
15	bis(2-chloroisopropyl)ether	5.00	U
16	3&4-Methylphenol (m&p-cresol)	5.00	U
17	N-Nitroso-di-n-propylamine	5.00	U
18	Hexachloroethane	5.00	U
19	Acetophenone	5.00	U
20	Nitrobenzene	5.00	U
21	N-Nitrosopiperidine	5.00	U
22	Isophorone	5.00	U
23	2-Nitrophenol	5.00	U
24	2,4-Dimethylphenol	5.00	U
25	bis(2-Chloroethoxy)methane	5.00	U
26	Benzoic Acid	5.00	U
27	2,4-Dichlorophenol	5.00	U
28	1,2,4-Trichlorobenzene	5.00	U
29	Naphthalene	5.00	U
30	4-Chloroaniline	5.00	U
31	2,6-Dichlorophenol	5.00	U
32	Hexachlorobutadiene	5.00	U
33	a,a-Dimethyl phenylamine	5.00	U
34	N-Nitroso-di-n-butylamine	5.00	U
35	4-Chloro-3-methylphenol	5.00	U
36	2-Methylnaphthalene	5.00	U

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: American Environmental Network, Inc.
Instrument ID: 5972 SEMI
GC Column:DB5-MS, .25mm
Matrix: WATER
Sample Vol.: 1 Liter
Extract Final Volume = 1.0ml

Lab Job I.D.: 97.01181
Lab Sample I.D:79293
Lab File ID: 04249721
Date Analyzed: 04/25/97
Dilution Factor: 1
Concentration Units: ug/L

	COMPOUND	MRL	CONCENTRATION
37	Hexachlorocyclopentadiene	5.00	U
38	1,2,4,5-Tetrachlorobenzene	5.00	U
39	2,4,6-Trichlorophenol	5.00	U
40	2,4,5-Trichlorophenol	5.00	U
41	2-Chloronaphthalene	5.00	U
42	1-Chloronaphthalene	5.00	U
43	2-Nitroaniline	5.00	U
44	Dimethylphthalate	5.00	U
45	Pentachlorobenzene	5.00	U
46	2,6-Dinitrotoluene	5.00	U
47	Acenaphthylene	5.00	U
48	3-Nitroaniline	5.00	U MJ
49	Acenaphthene	5.00	U
50	2,4-Dinitrophenol	5.00	U
51	4-Nitrophenol	5.00	U
52	Dibenzofuran	5.00	U
53	2,4-Dinitrotoluene	5.00	U
54	2-Naphthalamine	NA	
55	2,3,4,6-Tetrachlorophenol	5.00	U
56	1-Naphtylamine	NA	
57	Diethylphthalate	5.00	U
58	4-Chlorophenyl-phenylether	5.00	U
59	Fluorene	5.00	U
60	4-Nitroaniline	5.00	U
61	4,6-Dinitro-2-methylphenol	5.00	U
62	N-Nitrosodiphenylamine & Diphenylamine	5.00	U
63	1,2-Diphenylhydrazine	5.00	U
64	Phenacetin	5.00	U
65	4-Bromophenyl-phenylether	5.00	U
66	Hexachlorobenzene	5.00	U
67	Pentachlorophenol	5.00	U
68	4-Aminobiphenyl	5.00	U
69	Pentachloronitrobenzene	5.00	U
70	Pronamide	5.00	U
71	Phenanthrene	5.00	U
72	Anthracene	5.00	U
73	Di-n-butylphthalate	5.00	U

000034

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: American Environmental Network, Inc.
Instrument ID: 5972 SEMI
GC Column:DB5-MS, .25mm
Matrix: WATER
Sample Vol.: 1 Liter
Extract Final Volume = 1.0ml

Lab Job I.D.: 97.01181
Lab Sample I.D:79292
Lab File ID: 04249720
Date Analyzed: 04/24/97
Dilution Factor: 1
Concentration Units: ug/L

COMPOUND	MRL	CONCENTRATION
37 Hexachlorocyclopentadiene	5.00	U
38 1,2,4,5-Tetrachlorobenzene	5.00	U
39 2,4,6-Trichlorophenol	5.00	U
40 2,4,5-Trichlorophenol	5.00	U
41 2-Chloronaphthalene	5.00	U
42 1-Chloronaphthalene	5.00	U
43 2-Nitroaniline	5.00	U
44 Dimethylphthalate	5.00	U
45 Pentachlorobenzene	5.00	U
46 2,6-Dinitrotoluene	5.00	U
47 Acenaphthylene	5.00	U
48 3-Nitroaniline	5.00	U UJ
49 Acenaphthene	5.00	U
50 2,4-Dinitrophenol	5.00	U
51 4-Nitrophenol	5.00	U
52 Dibenzofuran	5.00	U
53 2,4-Dinitrotoluene	5.00	U
54 2-Naphthalamine	NA	
55 2,3,4,6-Tetrachlorophenol	5.00	U
56 1-Naphtylamine	NA	
57 Diethylphthalate	5.00	U
58 4-Chlorophenyl-phenylether	5.00	U
59 Fluorene	5.00	U
60 4-Nitroaniline	5.00	U
61 4,6-Dinitro-2-methylphenol	5.00	U
62 N-Nitrosodiphenylamine & Diphenylamine	5.00	U
63 1,2-Diphenylhydrazine	5.00	U
64 Phenacetin	5.00	U
65 4-Bromophenyl-phenylether	5.00	U
66 Hexachlorobenzene	5.00	U
67 Pentachlorophenol	5.00	U
68 4-Aminobiphenyl	5.00	U
69 Pentachloronitrobenzene	5.00	U
70 Pronamide	5.00	U
71 Phenanthrene	5.00	U
72 Anthracene	5.00	U
73 Di-n-butylphthalate	5.00	U

000031

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: American Environmental Network, Inc.
Instrument ID: 5972 SEMI
GC Column:DB5-MS, .25mm
Matrix: WATER
Sample Vol.: 1 Liter
Extract Final Volume = 1.0ml

Lab Job I.D.: 97.01181
Lab Sample I.D: 79292
Lab File ID: 04249720
Date Analyzed: 04/24/97
Dilution Factor: 1
Concentration Units: ug/l

COMPOUND	MRL	CONCENTRATION	
74 Fluoranthene	5.00	U	
75 Benzidine	NA		
76 Pyrene	5.00	U	
77 p-Dimethylaminozobenzene	5.00	U	
78 Butylbenzylphthalate	5.00	U	
79 3,3'-Dichlorobenzidine	5.00	U	
80 Bis(2-ethylhexyl)phthalate	5.00	2.1	B,J U
81 Benzo[a]anthracene	5.00	U	
82 Chrysene	5.00	U	
83 Di-n-octylphthalate	5.00	U	
84 7,12-Dimethylbenz(a)anthracene	5.00	U	
85 Benzo[b]fluoranthene	5.00	U	
86 Benzo[k]fluoranthene	5.00	U	
87 Benzo[a]pyrene	5.00	U	
88 Dibenz(a,j)acridine	5.00	U	
89 3-Methyl cholanthrene	5.00	U	
90 Indeno[1,2,3-cd]pyrene	5.00	U UJ	
91 Dibenz[a,h]anthracene	5.00	U UJ	
92 Benzo[g,h,i]perylene	5.00	U UJ	

SURROGATES:		CONTROL LIMITS:
2-Fluorophenol	28%	21-100%
Phenol-d5	20%	10-94%
Nitrobenzene-d5	62%	35-114%
2-Fluorobiphenyl	69%	43-116%
2,4,6-Tribromophenol	63%	10-123%
Terphenyl-d14	69%	33-141%

H = Surrogate Recovery outside control limits.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: American Environmental Network, Inc.
Instrument ID: 5972 SEMI
GC Column:DB5-MS, .25mm
Matrix: WATER
Sample Vol.: 1 Liter
Extract Final Volume = 1.0ml

Lab Job I.D.: 97.01181
Lab Sample I.D: 79293
Lab File ID: 04249721
Date Analyzed: 04/25/97
Dilution Factor: 1
Concentration Units: ug/l

	COMPOUND	MRL	CONCENTRATION	
74	Fluoranthene	5.00	U	
75	Benzidine	NA		
76	Pyrene	5.00	U	
77	p-Dimethylaminozobenzene	5.00	U	
78	Butylbenzylphthalate	5.00	U	
79	3,3'-Dichlorobenzidine	5.00	U	
80	Bis(2-ethylhexyl)phthalate	5.00	3.9	B,J U
81	Benzo[a]anthracene	5.00	U	
82	Chrysene	5.00	U	
83	Di-n-octylphthalate	5.00	U	
84	7,12-Dimethylbenz(a)anthracene	5.00	U	
85	Benzo[b]fluoranthene	5.00	U	
86	Benzo[k]fluoranthene	5.00	U	
87	Benzo[a]pyrene	5.00	U	
88	Dibenz(a,j)acridine	5.00	U	
89	3-Methyl cholanthrene	5.00	U	
90	Indeno(1,2,3-cd)pyrene	5.00	U	UJ
91	Dibenz[a,h]anthracene	5.00	U	UJ
92	Benzo(g,h,i)perylene	5.00	U	UJ

SURROGATES:			CONTROL LIMITS:
2-Fluorophenol	19%	H	21-100%
Phenol-d5	13%		10-94%
Nitrobenzene-d5	58%		35-114%
2-Fluorobiphenyl	64%		43-116%
2,4,6-Tribromophenol	44%		10-123%
Terphenyl-d14	60%		33-141%

H = Surrogate Recovery outside control limits.

000035

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: American Environmental Network, Inc.
Instrument ID: 5972 SEMI
GC Column:DB5-MS, .25mm
Matrix: WATER
Sample Vol.: 1 Liter
Extract Final Volume = 1.0ml

Lab Job I.D.: 97.01181
Lab Sample I.D:79294
Lab File ID: 04249722
Date Analyzed: 04/25/97
Dilution Factor: 1
Concentration Units: ug/L

	COMPOUND	MRL	CONCENTRATION
1	Pyridine	5.00	U
2	N-Nitrosodimethylamine	5.00	U
3	2-Picoline	5.00	U
4	Methyl methanesulfonate	5.00	U
5	Ethyl methanesulfonate	5.00	U
6	Phenol	5.00	U
7	Aniline	5.00	U
8	bis(2-Chloroethyl)ether	5.00	U
9	2-Chlorophenol	5.00	U
10	1,3-Dichlorobenzene	5.00	U
11	1,4-Dichlorobenzene	5.00	U
12	1,2-Dichlorobenzene	5.00	U
13	Benzyl alcohol	5.00	U
14	2-Methylphenol (o-cresol)	5.00	U
15	bis(2-chloroisopropyl)ether	5.00	U
16	3&4-Methylphenol (m&p-cresol)	5.00	U
17	N-Nitroso-di-n-propylamine	5.00	U
18	Hexachloroethane	5.00	U
19	Acetophenone	5.00	U
20	Nitrobenzene	5.00	U
21	N-Nitrosopiperidine	5.00	U
22	Isophorone	5.00	U
23	2-Nitrophenol	5.00	U
24	2,4-Dimethylphenol	5.00	U
25	bis(2-Chloroethoxy)methane	5.00	U
26	Benzoic Acid	5.00	U
27	2,4-Dichlorophenol	5.00	U
28	1,2,4-Trichlorobenzene	5.00	U
29	Naphthalene	5.00	U
30	4-Chloroaniline	5.00	U
31	2,6-Dichlorophenol	5.00	U
32	Hexachlorobutadiene	5.00	U
33	a,a-Dimethyl phenylamine	5.00	U
34	N-Nitroso-di-n-butylamine	5.00	U
35	4-Chloro-3-methylphenol	5.00	U
36	2-Methylnaphthalene	5.00	U

000036

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: American Environmental Network, Inc.
Instrument ID: 5972 SEMI
GC Column:DB5-MS, .25mm
Matrix: WATER
Sample Vol.: 1 Liter
Extract Final Volume = 1.0ml

Lab Job I.D.:. 97.01181
Lab Sample I.D:79294
Lab File ID: 04249722
Date Analyzed: 04/25/97
Dilution Factor: 1
Concentration Units: ug/L

COMPOUND	MRL	CONCENTRATION
37 Hexachlorocyclopentadiene	5.00	U
38 1,2,4,5-Tetrachlorobenzene	5.00	U
39 2,4,6-Trichlorophenol	5.00	U
40 2,4,5-Trichlorophenol	5.00	U
41 2-Chloronaphthalene	5.00	U
42 1-Chloronaphthalene	5.00	U
43 2-Nitroaniline	5.00	U
44 Dimethylphthalate	5.00	U
45 Pentachlorobenzene	5.00	U
46 2,6-Dinitrotoluene	5.00	U
47 Acenaphthylene	5.00	U
48 3-Nitroaniline	5.00	U UJ
49 Acenaphthene	5.00	U
50 2,4-Dinitrophenol	5.00	U
51 4-Nitrophenol	5.00	U
52 Dibenzofuran	5.00	U
53 2,4-Dinitrotoluene	5.00	U
54 2-Naphthalamine	NA	
55 2,3,4,6-Tetrachlorophenol	5.00	U
56 1-Naphtylamine	NA	
57 Diethylphthalate	5.00	U
58 4-Chlorophenyl-phenylether	5.00	U
59 Fluorene	5.00	U
60 4-Nitroaniline	5.00	U
61 4,6-Dinitro-2-methylphenol	5.00	U
62 N-Nitrosodiphenylamine & Diphenylamine	5.00	U
63 1,2-Diphenylhydrazine	5.00	U
64 Phenacetin	5.00	U
65 4-Bromophenyl-phenylether	5.00	U
66 Hexachlorobenzene	5.00	U
67 Pentachlorophenol	5.00	U
68 4-Aminobiphenyl	5.00	U
69 Pentachloronitrobenzene	5.00	U
70 Pronamide	5.00	U
71 Phenanthrene	5.00	U
72 Anthracene	5.00	U
73 Di-n-butylphthalate	5.00	U

000037

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: American Environmental Network, Inc.
Instrument ID: 5972 SEMI
GC Column:DB5-MS, .25mm
Matrix: WATER
Sample Vol.: 1 Liter
Extract Final Volume = 1.0ml

Lab Job I.D.: 97.01181
Lab Sample I.D:79294
Lab File ID: 04249722
Date Analyzed: 04/25/97
Dilution Factor: 1
Concentration Units: ug/L

COMPOUND	MRL	CONCENTRATION
74 Fluoranthene	5.00	U
75 Benzidine	NA	
76 Pyrene	5.00	U
77 p-Dimethylaminozobenzene	5.00	U
78 Butylbenzylphthalate	5.00	U
79 3,3'-Dichlorobenzidine	5.00	U
80 Bis(2-ethylhexyl)phthalate	5.00	U
81 Benzo[a]anthracene	5.00	U
82 Chrysene	5.00	U
83 Di-n-octylphthalate	5.00	U UJ
84 7,12-Dimethylbenz(a)anthracene	5.00	U UJ
85 Benzo[b]fluoranthene	5.00	U UJ
86 Benzo[k]fluoranthene	5.00	U UJ
87 Benzo[a]pyrene	5.00	U UJ
88 Dibenz(a,j)acridine	5.00	U UJ
89 3-Methyl cholanthrene	5.00	U UJ
90 Indeno[1,2,3-cd]pyrene	5.00	U UJ
91 Dibenz[a,h]anthracene	5.00	U UJ
92 Benzo[g,h,i]perylene	5.00	U UJ

SURROGATES:		LIMITS
2-Fluorophenol	35%	21-100%
Phenol-d5	24%	10-94%
Nitrobenzene-d5	61%	35-114%
2-Fluorobiphenyl	68%	43-116%
2,4,6-Tribromophenol	63%	10-123%
Terphenyl-d14	71%	33-141%

H = Surrogate Recovery is outside Control Limit.

000038

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SEA406294

DATA VALIDATION REPORT FOR EXTRACTABLE TOTAL PETROLEUM HYDROCARBON ANALYTICAL RESULTS FOR SAMPLES COLLECTED ON APRIL 11, 1997, FROM THE SEATTLE AIR NATIONAL GUARD STATION IN SEATTLE, WASHINGTON

AMERICAN ENVIRONMENTAL NETWORK LABORATORY - DURHAM, OREGON
WORK ORDER NO. 97.01181

Prepared for
Air National Guard

February 1998

ERM File: 1181TPHe.doc

NARRATIVE

Environmental Resources Management (ERM) collected four water samples and one duplicate sample from the Air National Guard Station in Seattle, Washington, on April 11, 1997. The samples were relinquished by ERM to the laboratory courier under documented chain of custody on April 11, 1997, for transport to American Environmental Network Laboratory (AEN) in Durham, Oregon.

The samples included in the validatable data package for this sample delivery group (SDG) were characterized as follows:

ERM Sample ID	Laboratory Sample ID	Level/ Matrix	Date Collected
BS-004PZ-97-2	79288	low/water	4/11/97
MW-5-97-2	79291	low/water	4/11/97
MW-5-97-2*	79292	low/water	4/11/97
MW-3-97-2	79293	low/water	4/11/97
MW-4-97-2	79294	low/water	4/11/97

AEN selected sample BS-004PZ-97-2 for the matrix spike/matrix spike duplicate sample pair. Sample MW-5-97-2* was the duplicate sample.

Extractable total petroleum hydrocarbon (TPH) data were acquired according to Washington Method WTPH-D. This method is based on USEPA SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, "Modified Method 8015" (November 1986, Third Edition, Volume 1B, Revision 2, September 1994).

Validation of these data was based on the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review* (Office of Solid Waste and Emergency Response, Publication 9240.1-05, PB94-9635-1, EPA-540/R-94/012, US Environmental Protection Agency, Washington, D. C., February 1993). (Organic Functional Guidelines).

The areas reviewed during the data validation procedure are listed below:

I. Sample Preservation and Holding Times

II. Initial Calibration

III. Continuing Calibration

IV. Blanks

V. Surrogate Spikes

VI. Matrix Spike/Matrix Spike Duplicates

VII. Laboratory Control Samples

VIII. Regional Quality Assurance and Quality Control

IX. Target Compound Identification

X. Compound Quantitation and Contract Required Quantitation Limits (CRQLs)

XI. System Performance

XII. Field Duplicates

XIII. Overall Assessment of Data

XIV. Documentation

All laboratory results have been accepted (unqualified), qualified, or rejected.

- Unqualified results are valid for the specified procedures and may be used without reservations.
- Qualified results are usable with the indicated limitation.
- Rejected results are unusable. The analyte may or may not be present. Resampling and reanalysis will be necessary for verification.

Qualified and rejected results are annotated in accordance with the Organic Functional Guidelines using the following codes:

U - The analyte was analyzed for but was not detected above the reported value.
J - The reported value is an estimate.
R - The data are unusable. The presence or absence of the analyte cannot be verified from the existing data. Resampling and reanalysis are necessary for verification.
N - There is presumptive evidence to make a tentative identification.
NJ - There is presumptive evidence to make a tentative identification; the reported value is an estimate.
UJ - The analyte was analyzed for but was not detected above the reported value; the reported value is an estimate.

DATA VALIDATION RESULTS

I. SAMPLE PRESERVATION AND HOLDING TIMES

The suggested maximum holding times specified by Washington Method WTPH-D for aqueous samples are 7 days from the date of collection to extract the sample and 30 days from the date of collection to analyze it. Extraction of the aqueous samples and analysis of the resultant sample extracts complied with these specifications.

No data were qualified or rejected based on improper sample preservation or exceedance of specified holding times.

II. INITIAL CALIBRATION

The GC employed for samples and associated quality control samples was calibrated at six concentration levels with a diesel standard.

The initial calibration is summarized below:

GC Instrument ID	Date	Time
GC - G	4/18/97	1220 - 1646

The percent relative standard deviations (%RSD) were less than or equal to 30 percent. No data were qualified or rejected based on this initial calibration.

III. CONTINUING CALIBRATION

The GC was calibrated for each subsequent 24-hour shift in which samples or associated quality control samples in this SDG were analyzed. Each continuing calibration was performed at one concentration level with a diesel standard.

The continuing calibrations are summarized below:

GC Instrument ID	Date	Time
GC - G	4/20/97 4/21/97 4/21/97	1657 0615 1906

Percent differences (%D) for the target compound were less than 25 percent. No data were qualified or rejected based on these continuing calibrations.

IV. BLANKS

The following method blank was associated with this SDG:

Blank ID	Level/ Matrix	Date Extracted	GC Instrument ID	Date Analyzed	Time
MB 102396 (pb#178)	low/water	4/16/97	GG - G	4/20/97	1734

The target compound was not reported in this blank.

The field blank (BS-006PZ-97-2*) associated with the validated samples was not included in the validatable data package. However, the results from this blank were reviewed. The target compound was not reported in the field blank.

An equipment rinsate blank was not submitted with this SDG.

No data were qualified or rejected based on the blank results.

V. SURROGATE SPIKES

All surrogate percent recoveries (%R) were within the specified quality control limits; therefore, no data were qualified or rejected based on surrogate spike recoveries.

VI. MATRIX SPIKE AND MATRIX SPIKE DUPLICATES

The following matrix spike/matrix spike duplicate (MS/MSD) sample pair was associated with the samples in this SDG:

Sample ID	Level/ Matrix	Date Extracted	GC Instrument ID	Date Analyzed	Time
BS-004PZ-97-2MS	low/water	4/16/97	GC - G	4/21/97	1236
BS-004PZ-97-2MSD	low/water	4/16/97	GC - G	4/21/97	1317

The MS/MSD %Rs and relative percent difference (RPD) were within specified quality control limits; therefore, no data were qualified or rejected based on MS/MSD %Rs or RPD.

VII. LABORATORY CONTROL SAMPLES

The following laboratory control sample/laboratory control sample duplicate (LCS/LCSD) pair was associated with the samples analyzed for TPH in this SDG:

Sample ID	Level/ Matrix	Date Extracted	GC Instrument ID	Date Analyzed	Time
LCS 97	low/water	4/16/97	GC - G	4/20/97	1811
(lcs#178)	low/water	4/16/97	GC - G	4/20/97	1848
LCSD					
(lcsd#178)					

The LCS/LCSD %Rs and RPD were within specified quality control limits; therefore, no data were qualified or rejected based on LCS/LCSD %Rs or RPD.

VIII. REGIONAL QUALITY ASSURANCE AND QUALITY CONTROL

No USEPA regional quality assurance and quality control samples were required for this investigation; these samples are typically required only for USEPA Superfund investigations.

IX. TARGET COMPOUND IDENTIFICATION

The target compound was not detected in the project samples. Therefore, the laboratory's ability to correctly identify the target compound was not evaluated.

X. COMPOUND QUANTITATION AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQLs)

The target compound was not detected in the project samples. The laboratory's practical quantitation limits met the CRQLs listed in the project Quality Assurance Project Plan.

XI. SYSTEM PERFORMANCE

No marked changes were observed in instrument performance during the analysis of the samples in this SDG, as determined by the validation.

XII. FIELD DUPLICATES

The field duplicate sample results in this SDG agreed with the associated primary sample results. Both the primary and field duplicate results were ND. These results indicate minimal heterogeneity in the sample matrix.

XIII. OVERALL ASSESSMENT OF DATA

The Validated Data section of this report provides the extractable TPH analysis data sheet for this SDG.

None of the extractable TPH data in this SDG were qualified or rejected.

XIV. DOCUMENTATION

The data package deliverables and analytical requirements specified in the SW-846 method protocols were met for this data set.

VALIDATED DATA

This section provides the extractable TPH analysis data sheet (1 sheet total).

GAS CHROMATOGRAPHY RESULTS

EST:	TPH-Diesel (Washington)	AEN I.D.:	97.01181
LIENT:	ERM West	DATE SAMPLED:	04/11/97
ROJECT #:	6032.2	DATE RECEIVED:	04/12/97
ROJECT NAME:	Seattle ANGS Qtly	DATE EXTRACTED:	04/16/97
AMPLE MATRIX:	WATER	UNITS:	ug/L

EN ID	CLIENT ID	DATE ANALYZED	DF	DIESEL C12 - C24	O-TERPHENYL 50%-150%
rep Blank	Prep Blank	04/18/97	1	ND	104%
CS	LCS	04/18/97	1	1697	119%
CS-D	LCS-D	04/18/97	1	1605	115%
9288	BS-004PZ-97-2	04/22/97	1	ND	100%
9291	MW-5-97-2	04/22/97	1	ND	96%
9292	MW-5-97-2*	04/22/97	1	ND	87%
9293	MW-3-97-2	04/22/97	1	ND	82%
9294	MW-4-97-2	04/22/97	1	ND	85%
9288-MS	BS-004PZ-97-2	04/22/97	1	1739	109%
9288-MSD	BS-004PZ-97-2	04/22/97	1	1948	120%

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Analyst: _____

Reviewer: _____

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SEA406303

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DATA VALIDATION REPORT FOR METAL ANALYTICAL RESULTS FOR SAMPLES COLLECTED ON APRIL 11, 1997, FROM THE SEATTLE AIR NATIONAL GUARD STATION IN SEATTLE, WASHINGTON

AMERICAN ENVIRONMENTAL NETWORK LABORATORY - DURHAM, OREGON
WORK ORDER NO. 97.01181

Prepared for
Air National Guard

February 1998

ERM File: 1181Metal.doc

NARRATIVE

Environmental Resources Management (ERM) collected four water samples and one duplicate sample from the Air National Guard Station in Seattle, Washington, on April 11, 1997. The samples were relinquished by ERM to the laboratory courier under documented chain of custody on April 11, 1997, for transport to American Environmental Network Laboratory (AEN) in Durham, Oregon.

The samples included in the validatable data package for this sample delivery group (SDG) were characterized as follows:

ERM Sample ID	Laboratory Sample ID	Level/ Matrix	Date Collected
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MW-5-97-2	79291	low/water	4/11/97
MW-5-97-2*	79292	low/water	4/11/97
MW-3-97-2	79293	low/water	4/11/97
MW-4-97-2	79294	low/water	4/11/97

AEN selected sample BS-004PZ-97-2 for the matrix spike and the laboratory duplicate sample analyses. Sample MW-5-97-2* was the field duplicate sample.

Metals data were acquired according to the USEPA SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, "Methods 6010/7000 Series" (November 1986, Third Edition, Volume 1B, Revision 2, September 1994).

Validation of these data was based on the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (Office of Solid Waste and Emergency Response, Publication 9240.1-05-01, PB94-963502, EPA-540/R-94/013, US Environmental Protection Agency, Washington, D. C., February 1994). (Inorganic Functional Guidelines).

The areas reviewed during the data validation procedure are listed below:

I. Sample Preservation and Holding Times

II. Calibrations

a. Initial Calibration
b. Initial and Continuing Calibration Verifications
c. Contract Required Detection Limit (CRDL) Standard for Mercury and ICP

III. Blanks

IV. ICP Interference Check Samples

V. Laboratory Control Samples (LCS)

VI. Duplicate Sample Analysis

VII. Spike Sample Analysis

VIII. Graphite Furnace Atomic Absorption Quality Control

IX. ICP Serial Dilution

X. Field Duplicates

XI. Overall Assessment of Data

XII. Documentation

All laboratory results have been either accepted (unqualified), qualified, or rejected.

- Unqualified results are valid for the specified procedures and may be used without reservations.
- Qualified results are usable with the indicated limitation.
- Rejected results are unusable. The analyte may or may not be present. Resampling and reanalysis will be necessary for verification.

Qualified and rejected results are annotated in accordance with the Inorganic Functional Guidelines using the following codes:

U	The analyte was analyzed for but was not detected above the reported value.
J	The reported value is an estimate.
R	The data are unusable. The presence or absence of the analyte cannot be verified from the existing data. Resampling and reanalysis are necessary for verification.
UJ	The analyte was analyzed for but was not detected above the reported value; the reported value is an estimate.

DATA VALIDATION RESULTS

I. SAMPLE PRESERVATION AND HOLDING TIMES

All inductively coupled plasma (ICP) metals samples were properly preserved (4°C ±2°C) and were digested and analyzed within the 6-month method-specified holding time from date of collection to date of analysis. All samples analyzed for mercury were properly preserved (4°C ±2°C) and were digested and analyzed within the method-specified 28-day holding time.

No data were qualified or rejected based on improper sample preservation or exceedance of specified holding times.

II. CALIBRATIONS

a. Initial Calibration

All initial calibrations were acceptably performed as required by SW-846 method protocols for the mercury and ICP analytical sequences.

No data were qualified or rejected based on this initial calibration.

b. Initial and Continuing Calibration Verifications

All initial and continuing calibration verifications were acceptably performed as required by SW-846 method protocols for the mercury and ICP analytical sequences.

c. Contract Required Detection Limit (CRDL) Standard for Mercury and ICP

All CRDL standard sample percent recoveries (%R) were between 75 and 125 percent, with the following exception:

Analyte	%R	Standard
Arsenic	67.5	Initial

The Inorganic Functional Guidelines do not adequately address CRDL %Rs. However, using professional judgment, data for arsenic were qualified as estimated detection limit, "UJ," based on the CRDL %Rs results.

III. BLANKS

The following preparation blanks were associated with these samples:

Prep Blank Sample ID	Associated ERM Sample ID
WPB (P) 4/18/97	All water samples in this SDG
WPB (CV) 4/15/97	All water samples in this SDG

No target analytes were reported in the preparation blanks.

The field blank (BS-006PZ-97-2*) associated with the validated samples was not included in the validatable data package. However, the results from this blank were reviewed. Zinc was reported at 42 ug/L in the field blank. Based on the USEPA 5x rule for analytes not considered to be common laboratory contaminants, zinc was qualified as nondetect ("U") at the reported concentrations in the associated project samples. An equipment rinsate blank was not submitted with this SDG.

IV. ICP INTERFERENCE CHECK SAMPLES

The %Rs of the ICP interference check samples (ICS) were acceptable (80 to 120 percent). In addition, no non-ICS analytes were present in the ICS solutions at levels (absolute values) greater than twice the instrument detection limit.

V. LABORATORY CONTROL SAMPLES (LCS)

The following LCS were associated with the samples in this SDG:

LCS ID	Associated ERM Sample ID
WLCS (P) 4/18/97	All water samples in this SDG
WLCS (CV) 4/15/97	All water samples in this SDG

All LCS results were within the established control limits; therefore, no data were qualified or rejected based on the LCS results.

VI. DUPLICATE SAMPLE ANALYSIS

The laboratory performed the laboratory duplicate sample analysis on the following sample:

ERM Sample ID	Laboratory Duplicate Sample ID
BS-004PZ-97-2	BS-004PZ-97-2D

The laboratory duplicate sample was associated with all of the water samples in this SDG.

The laboratory duplicate relative percent differences (RPD) were within specified quality control limits. None of the data were qualified or rejected based on the RPDs for the laboratory duplicate analysis.

VII. SPIKE SAMPLE ANALYSIS

The laboratory performed the matrix spike (MS) sample analysis on the following sample:

ERM Sample ID	Laboratory Spike Sample ID
BS-004PZ-97-2	BS-004PZ-97-2S

The MS sample was associated with all of the water samples in this SDG.

The MS %Rs were within specified quality control limits; therefore, none of the data were qualified or rejected based on MS %Rs.

VIII. GRAPHITE FURNACE ATOMIC ABSORPTION QUALITY CONTROL

None of the samples in this SDG were analyzed by graphite furnace.

IX. ICP SERIAL DILUTION

The laboratory performed the ICP serial dilution analysis on the following nonproject sample:

Sample ID	Laboratory Serial Dilution Sample ID
MW900-1-97-1	MW900-1-97-1L

The ICP serial dilution sample was associated with all of the water samples in this SDG.

The ICP serial dilution percent differences (%D) were within specified quality control limits, with the following exceptions:

Lab Serial Sample ID	Metal	%D
MW900-1-97-1L	Arsenic	46.2
	Chromium	26.7
	Lead	28.6
	Nickel	34.5
	Zinc	21.2

Because the sample selected for the serial dilution analysis was a nonproject sample, none of the data were qualified or rejected based on the %D results.

X. FIELD DUPLICATES

The field duplicate sample was identified as follows:

ERM Sample ID	ERM Duplicate Sample ID
MW-5-97-2	MW-5-97-2*

The field duplicate RPDs were within expected quality control limits, except for zinc with an RPD of 108 percent. The zinc results for both samples were previously qualified as not detected, "U," based on a zinc detection in the associated field blank. No additional data qualification was necessary.

XI. OVERALL ASSESSMENT OF DATA

The Validated Data section of this report provides the metal analysis data sheets for this SDG which include all data validation qualifiers applied by ERM.

Five non-detect data points for one target analyte were qualified as estimated detection limit, "UJ." Five data points for one target analyte were qualified as not detected, "U." No data were rejected.

XII. DOCUMENTATION

The data package deliverables and analytical requirements specified in the SW-846 method protocols were met for this data set.

VALIDATED DATA

This section provides the metal analysis data sheets with the data validation qualifiers applied by ERM (5 sheets total).

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.
BS-004PZ-97-2

Lab Name: AEN Contract:
Lab Code: Case No.: SAS No.: SDG No.:
Matrix (soil/water): Water Lab Sample ID: 79288
Level (low/med): Low Date Received: 4/14/97
% Solids:

Concentration Units (ug/L or mg/kg dry weight): ug/L

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum					
7440-36-0	Antimony	5	U		P	
7440-38-2	Arsenic	5	U		P	UJ
7440-39-3	Barium					
7440-41-7	Beryllium	2	U		P	
7440-43-9	Cadmium	2	U		P	
7440-70-2	Calcium					
7440-47-3	Chromium	5	U		P	
7440-48-4	Cobalt					
7440-50-8	Copper	5			P	
7439-89-6	Iron					
7439-92-1	Lead	5	U		P	
7439-95-4	Magnesium					
7439-96-5	Manganese					
7439-97-6	Mercury	0.2	U		AV	
7440-02-0	Nickel	5	U		P	
7440-09-7	Potassium					
7782-49-2	Selenium	5	U		P	~~UJ~~ (RCL)
7440-22-4	Silver	5	U		P	~~UJ~~ (RCL)
7440-23-5	Sodium					
7440-28-0	Thallium	5	U		P	
7440-62-2	Vanadium					
7440-66-6	Zinc	21			P	U

Color Before: Colorless Clarity Before: Clear Texture:
Color After: Colorless Clarity After: Clear Artifacts:
Comments:

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1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.
MW-5-97-2

Lab Name: AEN Contract:
Lab Code: Case No.: SAS No.: SDG No.:
Matrix (soil/water): Water Lab Sample ID: 79291
Level (low/med): Low Date Received: 4/14/97
% Solids:

Concentration Units (ug/L or mg/kg dry weight): ug/L

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum					
7440-36-0	Antimony	5	U		P	
7440-38-2	Arsenic	5	U		P	UJ
7440-39-3	Barium					
7440-41-7	Beryllium	2	U		P	
7440-43-9	Cadmium	2	U		P	
7440-70-2	Calcium					
7440-47-3	Chromium	5	U		P	
7440-48-4	Cobalt					
7440-50-8	Copper	5	U		P	
7439-89-6	Iron					
7439-92-1	Lead	5	U		P	
7439-95-4	Magnesium					
7439-96-5	Manganese					
7439-97-6	Mercury	0.2	U		AV	
7440-02-0	Nickel	8			P	
7440-09-7	Potassium					
7782-49-2	Selenium	5	U		P	~~UJ~~ (RCL)
7440-22-4	Silver	5	U		P	~~UJ~~ (RCL)
7440-23-5	Sodium					
7440-28-0	Thallium	5	U		P	
7440-62-2	Vanadium					
7440-66-6	Zinc	99.7			P	(RCL) J U

Color Before Colorless Clarity Before: Clear Texture:
Color After: Colorless Clarity After: Clear Artifacts:
Comments:

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1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.
MW-5-97-2"

Lab Name: AEN Contract:
Lab Code: Case No.: SAS No.: SDG No.:
Matrix (soil/water): Water Lab Sample ID: 79292
Level (low/med): Low Date Received: 4/14/97
% Solids:

Concentration Units (ug/L or mg/kg dry weight): ug/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony	5	U		P
7440-38-2	Arsenic	5	U		P
7440-39-3	Barium				
7440-41-7	Beryllium	2	U		P
7440-43-9	Cadmium	2	U		P
7440-70-2	Calcium				
7440-47-3	Chromium	5	U		P
7440-48-4	Cobalt				
7440-50-8	Copper	5	U		P
7439-89-6	Iron				
7439-92-1	Lead	5	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	0.2	U		AV
7440-02-0	Nickel	7			P
7440-09-7	Potassium				
7782-49-2	Selenium	5	U		P
7440-22-4	Silver	5	U		P
7440-23-5	Sodium				
7440-28-0	Thallium	5	U		P
7440-62-2	Vanadium				
7440-66-6	Zinc	29.8			P

Color Before Colorless Clarity Before: Clear Texture:
Color After: Colorless Clarity After: Clear Artifacts:
Comments:

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1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.
MW-3-97-2

Lab Name: AEN Contract:
Lab Code: Case No.: SAS No.: SDG No.:
Matrix (soil/water): Water Lab Sample ID: 79293
Level (low/med): Low Date Received: 4/14/97
% Solids:

Concentration Units (ug/L or mg/kg dry weight): ug/L

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum					
7440-36-0	Antimony	5	U		P	
7440-38-2	Arsenic	5	U		P	UJ
7440-39-3	Barium					
7440-41-7	Beryllium	2	U		P	
7440-43-9	Cadmium	2	U		P	
7440-70-2	Calcium					
7440-47-3	Chromium	5	U		P	
7440-48-4	Cobalt					
7440-50-8	Copper	5	U		P	
7439-89-6	Iron					
7439-92-1	Lead	5	U		P	
7439-95-4	Magnesium					
7439-96-5	Manganese					
7439-97-6	Mercury	0.2	U		AV	
7440-02-0	Nickel	8			P	
7440-09-7	Potassium					
7782-49-2	Selenium	5	U		P	~~UJ~~ (RCL)
7440-22-4	Silver	5	U		P	~~UJ~~ (RCL)
7440-23-5	Sodium					
7440-28-0	Thallium	5	U		P	
7440-62-2	Vanadium					
7440-66-6	Zinc	109			P	U

Color Before Colorless Clarity Before: Clear Texture:
Color After: Colorless Clarity After: Clear Artifacts:
Comments:

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1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.
MW-4-97-2

Lab Name: AEN Contract:
Lab Code: Case No.: SAS No.: SDG No.:
Matrix (soil/water): Water Lab Sample ID: 79294
Level (low/med): Low Date Received: 4/14/97
% Solids:

Concentration Units (ug/L or mg/kg dry weight): ug/L

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum					
7440-36-0	Antimony	5	U		P	
7440-38-2	Arsenic	5	U		P	UJ
7440-39-3	Barium					
7440-41-7	Beryllium	2	U		P	
7440-43-9	Cadmium	2	U		P	
7440-70-2	Calcium					
7440-47-3	Chromium	5	U		P	
7440-48-4	Cobalt					
7440-50-8	Copper	5	U		P	
7439-89-6	Iron					
7439-92-1	Lead	5	U		P	
7439-95-4	Magnesium					
7439-96-5	Manganese					
7439-97-6	Mercury	0.2	U		AV	
7440-02-0	Nickel	9			P	
7440-09-7	Potassium					
7782-49-2	Selenium	5	U		P	~~UJ~~ (RCL)
7440-22-4	Silver	5	U		P	~~UJ~~ (RCL)
7440-23-5	Sodium					
7440-28-0	Thallium	5	U		P	
7440-62-2	Vanadium					
7440-66-6	Zinc	129			P	U

Color Before Colorless Clarity Before: Clear Texture:
Color After: Colorless Clarity After: Clear Artifacts:
Comments:

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